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# RAILROAD RESEARCH BULLETIN



**Autumn 1978**  
**Volume 5 Number 2**

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February 1978 and July 1978

**U.S. DEPARTMENT OF TRANSPORTATION**  
**Federal Railroad Administration**

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**Railroad Research Information Service**  
**Transportation Research Board**

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The Transportation Research Board is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 150 committees and task forces composed of more than 1800 administrators, engineers, social scientists, and educators who serve without compensation. The program is supported by state transportation and highway departments, the major administrations of the U.S. Department of Transportation, the Association of American Railroads, and other organizations interested in the development of transportation.

The Transportation Research Board operates within the Commission on Sociotechnical Systems of the National Research Council. The Council was organized in 1916 at the request of President Woodrow Wilson as an agency of the National Academy of Sciences to enable the broad community of scientists and engineers to associate their efforts with those of the Academy membership. Members of the Council are appointed by the president of the Academy and are drawn from academic, industrial, and governmental organizations throughout the United States.

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To share in the task of furthering science and engineering and of advising the federal government, the National Academy of Engineering was established on December 5, 1964, under the authority of the act of incorporation of the National Academy of Sciences. Its advisory activities are closely coordinated with those of the National Academy of Sciences, but it is independent and autonomous in its organization and election of members.

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# Foreword

This *Bulletin*, containing 1045 abstracts of journal articles, research reports, computer programs, and magnetic tape data sets and 531 summaries of ongoing research activities, covers material accessioned by the Railroad Research Information Service between August 1977 and January 1978.

The *Railroad Research Bulletin*, published semiannually, contains material added to the RRIS file during the preceding 6 months. Previous editions should be retained. Although RRIS publications are not themselves copyrighted, many of the abstracts in them are and are used with the permission of the copyright holder. In the *Railroad Research Bulletin*, any abstract followed by "Acknowledgment" should be considered as possibly subject to copyright, and anyone wishing to reproduce abstracts from RRIS publications should secure permission from the holder of the copyright.

The scope of RRIS includes rail rapid transit and light rail transit. All items in the RRIS file are classified according to the basic system, and there is no separate classification for transit material. Items pertaining to rail transit can be identified under the term "Rapid Transit" in the Subject Term Index, where the document record numbers for such items are given.

The RRIS Cumulative Subject Index 1973-1975 is available from the Railroad Research Information Service along with most of the editions of the *Railroad Research Bulletin*. Some RRIS publications are available from the National Technical Information Service at somewhat higher prices. In addition to acquisition and selection, RRIS work includes the classification, indexing, storage, retrieval, and dissemination of abstracts and summaries.

## RRIS FILE SEARCHES

The RRIS file is maintained on magnetic computer tape and is available for searches for information related to specific inquiries. The key to searching is RRIS categories, appropriate subject terms, dates, performing agencies, or other data elements. The search is performed by computer. Output may include abstracts of articles and reports, descriptions of computer programs, and summaries of ongoing research. The output is computer printed and similar in format to citations that appear in this publication.

The fee schedule for RRIS title searches reflects the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services. The charge for computer retrieval from the RRIS file is \$50 per request plus

\$0.25 per citation after screening by RRIS. A written authorization or purchase order is required before the retrieval is made.

## USING THE RAILROAD RESEARCH BULLETIN

This volume is divided into three major sections: abstracts of documents; summaries of ongoing research; and indexes by subject, author, and source.

If you are interested in reviewing reports of completed research and other published documents, turn to the section, Abstracts of Reports and Journal Articles. The material in this section is arranged by RRIS subject areas. The subject area and the subject area number are listed in the Contents and appear at the top of each page.

If you are interested in ongoing research projects, turn to the section, Ongoing Research Summaries. These summaries are also arranged by subject areas, which with the subject area number appear at the top of each page. An A after the subject area number identifies ongoing research project summaries.

If you can identify your interest by subject, turn to the Subject Term Index. Each term in this index is followed by the document record number, which consists of the two-digit subject area number and the six-digit TRIS accession number that identifies the individual document under that subject area. An A after subject area numbers indicates that the item is a summary of ongoing research. The items are arranged in order of ascending accession numbers within each subject area.

If you are looking for abstracts of articles or reports written by a particular author or summaries of projects being conducted by a particular investigator, turn to the Author and Investigator Index and look for the individual's last name in the alphabetized listing. Again the document record number is used to find the item in the abstract or summary section.

If you are interested in abstracts of articles or reports that appeared in a particular publication or were the work of a specific publisher or if you are interested in summaries of research projects being conducted by a specific organization, turn to the Source Index. Again, use the document record number to find the item in the abstract or summary section.

Although the Subject Term Index gives a general idea of the scope of the RRIS classification system, information is available on many other terms that do not appear in this edition.

# Availability of Documents

An availability statement is included with most abstracts. Addresses for ordering documents are given with the abstracts or with the publisher listing in the Source Index. Copies of reports and articles listed in this publication are not available from the Railroad Research Information Service. When ordering from any source, give full information on the item wanted. When ordering from the National Technical Information Service, be sure to give the NTIS accession number as well as the title and

other information. When no availability is specified with an abstract, consult an established transportation library. A loan service for publications and a photocopy service for articles and papers are available at two TRISNET Centers as explained on page vi. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating those sources as follows:

<b>AAR</b> Association of American Railroads 1920 L Street, N.W. Washington, D.C. 20036	<b>GPO</b> Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402	<b>SNAME</b> Society of Naval Architects and Marine Engineers 74 Trinity Place New York, New York 10006
<b>AAR</b> For technical reports identified by a report number such as R-253: Association of American Railroads Technical Center 3140 South Federal Street Chicago, Illinois 60616	<b>IEEE</b> Institute of Electrical and Electronics Engineers 345 East Forty-seventh Street New York, New York 10017	<b>TRB</b> Transportation Research Board Publications Office 2101 Constitution Avenue, N.W. Washington, D.C. 20418
<b>AIAA</b> American Institute of Aeronautics and Astronautics Technical Information Service 750 Third Avenue New York, New York 10017	<b>IPC</b> IPC (America), Inc. 205 East Forty-second Street New York, New York 10017	<b>TRRL</b> Transport and Road Research Laboratory Crowthorne, Berkshire RG11 6AU England
<b>AREA</b> American Railway Engineering Association 59 East Van Buren Street Chicago, Illinois 60605	<b>IT</b> Transport Publishing House Basmannyi Tupik 6A Moscow B-174, USSR	<b>TSC</b> Transportation Systems Center 55 Broadway Cambridge, Massachusetts 02142
<b>ASCE</b> American Society of Civil Engineers 345 East Forty-seventh Street New York, New York 10017	<b>MPS</b> USSR Ministry of Railways Novo-Basmanaya, ul.2 Moscow B-174, USSR	<b>TsNITEI</b> Central Scientific Research Institute of Information and Technical and Economic Research Raushskaia Nab 4 Moscow 113035, USSR
<b>ASME</b> American Society of Mechanical Engineers 345 East Forty-seventh Street New York, New York 10017	<b>NAE/NAS/NRC</b> National Academy of Sciences Publication Sales 2101 Constitution Avenue, N.W. Washington, D.C. 20418	<b>UIC</b> International Union of Railways, BD 14-16 Rue Jean-Rey 75015 Paris France
<b>CIGGT</b> Canadian Institute of Guided Ground Transport Queen's University Kingston, Ontario K7L 3N6 Canada	<b>NTIS</b> National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161	<b>UIC/ORE</b> For technical reports identified by a report number such as B125/RP3/E (note restrictions below): International Union of Railways Office for Research and Experiments Oudenoord 60 Utrecht, Netherlands
<b>DOT</b> U.S. Department of Transportation Nassif Building 400 Seventh Street, S.W. Washington, D.C. 20590	<b>OECD</b> OECD Publications Center Room 1207 1750 Pennsylvania Avenue, N.W. Washington, D.C. 20006	<b>UITP</b> International Union of Public Transport Avenue de l'Uruguay 19 B-1050, Brussels Belgium
<b>ECMT</b> All documents available through OECD (see below)	<b>ORE</b> See UIC/ORE below.	<b>UMI</b> University Microfilms International 300 North Zeeb Road Ann Arbor, Michigan 48106
<b>ESL</b> Engineering Societies Library 345 East Forty-seventh Street New York, New York 10017	<b>OST</b> Office of the Secretary U.S. Department of Transportation 400 Seventh Street, S.W. Washington, D.C. 20590	<b>UMTA</b> Urban Mass Transportation Administration 400 Seventh Street, S.W. Washington, D.C. 20590
<b>FRA</b> Federal Railroad Administration Transpoint Building 2100 Second Street, S.W. Washington, D.C. 20590	<b>RPI</b> Railway Progress Institute 801 North Fairfax Street Alexandria, Virginia 22314	
	<b>RTAC</b> Roads and Transportation Association of Canada 875 Carling Avenue Ottawa, Ontario K1S 5A4 Canada	
	<b>SAE</b> Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pennsylvania 15096	

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The objective of the TRISNET Centers is to provide the documents identified through search of the Transportation Research Information Service (TRIS) abstracting and indexing services (RRIS and the Air, Highway, and Maritime Transportation Research Information Services).

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Accession number  
Author  
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fornia requires submission of an interlibrary loan request) or for photocopies of articles or conference papers. If the document is unavailable at the library, referral to the best available source will be made.

Loan services are free when publications are mailed at the book rate. If the user requires priority mailing, the library will charge for mailing costs. Photocopies of articles or individual conference papers are made at the rate of 10 cents per page plus a handling charge of 50 cents per item. In all cases, invoices are mailed with the loan or photocopy.

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Berkeley, CA 94720  
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Certain publications of the International Union of Railways (UIC) that are cited in the holdings of the Railroad Research Information Service are subject to restrictions on use. These apply particularly to the reports of the UIC Office for Research and Experiments (ORE).

The president of ORE indicates those reports that can be made available to third parties (industrial firms, individuals, universities, and technical colleges). For each report a price per copy and a separate fee for the right-of-use are established.

Members of ORE—certain railroad administrations that are members of UIC and, in the United States, the Federal Railroad Administration of the U.S. Department of Transportation—receive the ORE reports and possess, by virtue of their membership, the right to use these reports. Possession by virtue of ORE membership or the acquisition of a right-of-use covering a specific report only authorizes the holder of the information in the report to use such data for his or her own needs. This right-of-use is nontransferable. Possession of right-of-use does not authorize the holder to communicate, even in part, the contents of such a report to third parties who have not also acquired a right-of-use. An exception may be made, with special ORE authorization, for use by contractors of those organizations that have the right-of-use. Patent rights and design rights associated with solutions developed by ORE research and

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# Abbreviations

AAR*	Association of American Railroads	OECD*	Organization for Economic Cooperation and Development
AIAA*	American Institute of Aeronautics and Astronautics	ORE*	Office for Research and Experiments, UIC
AREA*	American Railway Engineering Association	OST*	Office of the Secretary of Transportation
ASCE*	American Society of Civil Engineers	PB	Prefix identifying an NTIS accession number
ASME*	American Society of Mechanical Engineers	Phot	Photographs
CIGGT*	Canadian Institute of Guided Ground Transport	Ref	References
CNR	Canadian National Railways HQ Library	Repr PC	Paper copy of original document
DOT*	U.S. Department of Transportation	RP	RRIS Repository (DOTL)
DOTL	U.S. Department of Transportation Library, Washington, D.C.	RPI*	Railway Progress Institute
ECMT*	European Conference of Ministers of Transport	Rpt	Report
EI	Engineering Index	RTAC*	Roads and Transportation Association of Canada
ESL*	Engineering Societies Library	SAE*	Society of Automotive Engineers
Fig	Figures	Shaw	Shaw Publishing Company Ltd.
FRA*	Federal Railroad Administration	SNAME*	Society of Naval Architects and Marine Engineers
FY	Fiscal year	Tab	Tables
GPO*	U.S. Government Printing Office	TRB*	Transportation Research Board
IEEE*	Institute of Electrical and Electronics Engineers	TRRL*	Transport and Road Research Laboratory
IPC*	IPC Transport Press Ltd.	TSC	Transportation Systems Center
IRCA	International Railway Congress Association	TsNII	All-Union Order of the Red Banner of Labor Scientific Research Institute of Railroad Transport
IRF	International Road Federation	TsNIITEI*	Central Scientific Research Institute of Information and Technical and Economic Research
IRRD	International Road Research Documentation	UIC*	International Union of Railways
IT*	Transport Publishing House	UITP*	International Union of Public Transport
JC	Journal Collection (DOTL)	UMI*	University Microfilms International
MPS*	USSR Ministry of Railways	UMTA*	Urban Mass Transportation Administration
NAE*	National Academy of Engineering		
NAS*	National Academy of Sciences		
NRC*	National Research Council		
NTIS*	National Technical Information Service		

\*See page v for availability of papers and research reports.

# Examples of Abstracts and Summaries

Abstracts are classified according to an eight-digit document record number: The first two-digits indicate the RRIS subject area number and the last six digits indicate the TRIS accession number, which is a unique number assigned to each document. The subject area number and the subject area appear at the tops of the pages in the abstract and summary

sections. The document record number appears at the top of each abstract. Abstracts within each subject area are listed in ascending order of the accession numbers, although these usually will not be consecutive. Examples of research report abstract and of a journal article abstract of both U.S. and non-U.S. journal articles appear below and on the next page.

## Abstract of a research report

Document record number	02 128640
TRIS accession number	
Subject area code	
Title	<b>TEST TRAIN PROGRAM SIXTH PROGRESS REPORT</b>
Research report abstract	This report describes the progress of the Rail Research Program involving operation of the FRA test cars and the performance of other rail research efforts during the period 1 July 1973 to 30 June 1974. Highlights of the work reported include operation of the FRA test cars to perform track surveys and other rail research activities; test car upgrading; expansion of the Rail Research Program; and data management and data analysis tasks which have been undertaken to benefit railroad technology. The Rail Research Program primarily involves the operation and instrumentation of the FRA test cars. This research program is designed to provide high-speed measurement of railroad track characteristics, development of comprehensive track measurement techniques, development of special testing instrumentation, and data evaluation through analysis and electronic processing. Sponsorship was from FRA, DOT.
Supplementary notes	
Authors, publication data, document data	Peterson, C Kaufman, WM Yang, TL Corbin, JC ENSCO, Incorporated, (DOT-FR-74-19) Prog Rpt. FRA- ORD&D-75-25, June 1974, 124 pp, 36 Fig.
Activity data	Contract DOT-FR-20032
Source of abstract	ACKNOWLEDGMENT: FRA
Availability	PURCHASE FROM: NTIS Repr. PC, Microfiche PB-247084/AS, DOTL NTIS
NTIS accession number	
Washington, D.C., availability with RP, JC, or call number	

## Abstract of a U.S. journal article

Document record number	02 131315
TRIS accession number	
Subject area code	
Title	<b>INVESTIGATION INTO CAUSES OF RAIL CORRUGATIONS</b>
Journal article abstract	Heavy traffic density and high-capacity cars increased wear and abrasion or curves which CP Rail countered with lubricators that cut flange abrasion but produced rail corrugation with a wavelength of 8 to 28 inches on the low rail. Plastic flow or rail head metal combined with surface fatigue are predominately responsible for rail corrugation. Recommendations for overcoming the problem includes improved wheel rail contact geometry through elimination of wide gauge, elimination of false flanges on wheels, reduction of railhead curvature and modification of the AAR wheel profile; cutting of lateral frictional force by use of self-steering trucks; changes in rail metallurgy to increase resistance to surface fatigue and plastic flow, reduction of dynamic loadings and improved flange lubrication techniques.
Author, publication data, document data	Kalousek, J Klein, R <i>AREA Bulletin</i> Vol. 77 Bulletin, Jan. 1976, pp 429-48, 15 Fig., 2 Tab., 7 Ref.
Source of abstract	ACKNOWLEDGMENT: AREA Bulletin
Availability	PURCHASE FROM: ESL Repr. PC, Microfilm
Washington, D.C., availability with RP, JC, or call number	

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### Abstract of a non-U.S. journal article

Document record number  
TRIS accession number  
Subject area code → **09 141649**

Translated title → **EXPERIMENTAL ANALYSIS OF THE DYNAMIC BEHAVIOR OF A MECHANICAL STRUCTURE. CONCEPT OF MECHANICAL IMPEDANCE** [Analyse experimentale du comportement dynamique d'une structure mecanique. Concept d'impedance mecanique]

Title in original language → The experimental method of analysis called "mechanical impedance" (the concept of mechanical impedance is of the same nature as that of electrical impedance) is used to study the dynamic behavior of the structure of the material. It reveals the vibration pattern in any given area of a component. The SNCF Testing Division uses this method to analyse stress patterns in components, to limit the amplitude of certain vibrations, or to monitor the condition of a metallic structure during operation. The applications of this method are shown by means of examples. [French]

Journal article abstract →

Language of full-text article →

Author, publication data, document data → **Butteaud, B** *Revue Generale des Chemins de Fer* May 1976, pp 304-323, 40 Fig., 3 App.

Source of abstract → **ACKNOWLEDGMENT: UIC**

Availability → **ORDER FROM: ESL**

Washington, D.C., availability with RP, JC, or call number → **DOTL JC**

The summaries of ongoing research describe research activities currently in progress or recently completed. Each summary indicates who is performing the project, who is funding it, and how the research goal is to be attained. A summary is not a document surrogate; that is, there may not

be a full report published on the project. The summaries are in the format shown below, although each one may not contain all the elements given in this sample. The document record numbers and the order listing are the same for both summaries and abstracts.

### Summary of ongoing research

Document record number  
TRIS accession number  
RRIS subject area number → **02 058303**

Project title → **FREIGHT CAR TRUCK DESIGN OPTIMIZATION**

Project summary → The Truck Design Optimization Project (TDOP) is a multiyear project intended to evaluate performance characteristics of existing railroad freight car trucks; determine through cost-benefit analysis the feasibility of improving truck performance by mechanical modification of existing type trucks or through introduction of new truck designs that respect carbody/-suspension system interfaces or are otherwise compatible with existing freight train systems; provide performance and testing specifications for use in the development of freight car suspension systems, and study concepts of integrated carbody support systems and advanced designs in anticipation of future railroad requirements.

Agency performing the work → **PERFORMING AGENCY: Southern Pacific Transportation Company**

Project investigators → **INVESTIGATOR: Byrne, R (Tel 415-362-1212X-22547)**

Project sponsors → **SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development**

Contract monitor → **RESPONSIBLE INDIVIDUAL: Fay, GR (Tel 202-426-0855)**

Project data → **Contract DOT-FR-40023**  
**STATUS: Active NOTICE DATE: Feb. 1976 START DATE: June 1974 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$2,000,000**

Source of this summary → **ACKNOWLEDGMENT: FRA**



# Abstracts of Reports and Journal Articles

## 00 Right-of-Way

00 053256

### STATISTICAL DISTRIBUTION OF AXLE-LOADS AND STRESSES IN RAILWAY BRIDGES. MOMENT RANGE SPECTRA IN RAILWAY BRIDGES, DERIVED FROM THE STATISTICAL TRAFFIC SPECTRUM

The report gives a statistical representation (statistical traffic spectrum) of railway traffic considered as a succession of vehicles (axle loads, axle spacings and order of succession of axles). It outlines the method for deducing from this the statistical distribution of the static bending moment ranges at the middle of a bridge of arbitrary span (moment range spectrum). The calculations are fairly short and the method lends itself well to the analysis of the influence of different traffic parameters.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 128/RP 7, Apr. 1977, 51 pp, 15 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

00 053264

### FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. CONSTANT AMPLITUDE FATIGUE TESTS OF I-BEAMS WITH TRANSVERSE AND LONGITUDINAL FILLET WELDS

Welded I-beams underwent constant amplitude fatigue testing. Beam A had transverse stiffeners welded into the beam and lateral steel plates welded on to the flanges, beam B transverse stiffeners in the compression zone welded into the beam and longitudinal steel plates welded on to the flanges. The results were evaluated with reference to the standardised Wohler line. Fatigue strength values differed, but were below design specifications.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 130/RP 5, Apr. 1977, 39 pp, 62 Fig., 36 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

00 053273

### FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. STUDY OF THE FATIGUE STRENGTH OF BOX-BEAMS SEALED WITH DIAPHRAGMS SUBJECTED TO CONSTANT AMPLITUDE AXIAL LOADING

Some longitudinal welded box sections sealed with transversely welded diaphragms have been subjected to fatigue tests under constant amplitude axial loading. The results are evaluated according to the normalised Wohler line. In this way, fatigue strength values are obtained for this type of stress concentration.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways D 130/RP 6, Oct. 1977, 25 pp, 21 Fig., 5 Tab., 3 App.

ACKNOWLEDGMENT: UIC

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DOTL RP

00 053278

### STATISTICAL DISTRIBUTION OF AXLE-LOADS AND STRESSES IN RAILWAY BRIDGES. ESTIMATE OF THE LIFE OF STEEL RAILWAY BRIDGES WITH GIVEN TRAFFIC

Making use of the train types of several railway Administrations presented in RP 5 and based on traffic parameters (e.g. daily train numbers, annual volume) traffic spectra were compiled and the stress-time histories calculated for given influence lines. The calculation methods used are given and explained by reference to examples. Possible applications to railway bridge dimensioning and fatigue life predictions are presented.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways D 128/RP 6, Oct. 1977, 51 pp, 20 Fig., 41 Tab., 5 App.

ACKNOWLEDGMENT: UIC

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DOTL RP

00 093742

### TUNNEL COST MODEL: USERS' MANUAL

This User's Manual provides the guidelines required to implement the Tunnel Cost Model (TCM) and its file structure, to prepare input data, and to operate the system. It also aids in identifying several interrelationships among data structures and program flow that affect the TCM results.

See also report dated Jul 74, PB-243 253.

Reynoso, SS Gray, DJ

Massachusetts Institute of Technology Press, National Science Foundation, (Tech. Rpt. No. 6) Tech Rpt. R75-29, NSF/RA/T-75/022, June 1975, 287 pp

Grant NSF-GI-34029

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-245835/4ST, DOTL NTIS

00 167852

### AUTOMATED OPTIMUM DESIGN OF SOME HIGHWAY BRIDGES AND BRIDGE ELEMENTS

During the past 20 years extensive developments in the application of math programming techniques to the automated, optimum design of structures have made it possible to consider the routine design office application of these techniques. The goal of this project was to produce working computer programs which the designer could use easily and effectively. Two quite different problems were approached; the design of continuous rolled beam bridge girders and the design of reinforced concrete slab bridges. A number of different classes of rolled beam bridges were studied. A computer program, GAD III having several options was developed to perform the design of non-composite, continuous rolled beams. The simplest option will select the lightest rolled beam which meets all requirements for the total length of the continuous beam. A second option will design a minimum cost continuous beam with coverplates. Only a single rolled beam section is allowed. A third option allows both coverplates and changes in rolled beam sections. The GAD VI program will design a minimum cost composite beam. Both beam and shear connectors are designed. The Minimum cost design of a continuous reinforced concrete slab bridge is performed by the GAD IV program. A uniform depth slab is used and all reinforcement is designed. All of these programs were written in FORTRAN and have been tested on both the UNIVAC 1108 and the IBM 360. /Author/

Sponsored by Ohio Department of Transportation.

Goble, GG Hsu, KY Yeung, J  
Case Western Reserve University, Federal Highway Administration,  
Ohio Department of Transportation Final Rpt. FHWA-RD-78-S0677,  
OHIO-DOT-10-77, Sept. 1974, 174 pp, Figs., Tabs., 3 Ref., 4 App.

Contract State Job 14222(0)

ORDER FROM: NTIS

00 168380

#### CANDE USER MANUAL

The manual contains input instructions, recommendations, and illustrations for a new computer program for culvert analysis and design (CANDE). The program is user-oriented in FORTRAN language. In three parts, Part 1 of the manual is a brief summary of the CANDE program, Part 2 provides formatted input instructions for data cards along with extensive commentaries and recommendations, while Part 3 contains example problems covering a wide range of potential applications and illustrating input/output features of CANDE. /Author/

Companion documents are FHWA-RD-77-5-Final Report and FHWA-RD-77-7-System Manual. This manual was sponsored by the Federal Highway Administration. See also PB-275807 and PB-275809. Also available in set of 3 reports PC E13, PB-275806-SET.

Katona, MG Smith, JM  
Naval Construction Battalion Center Final Rpt. FHWA-RD-77- 6, Oct. 1976, 155 pp

Contract P.O. #I.A. 3-1170

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275808/4ST

00 168387

#### EVALUATION OF FLOOD RISK FACTORS IN THE DESIGN OF HIGHWAY STREAM CROSSINGS. VOLUME II--ANALYSIS OF BRIDGE BACKWATER EXPERIMENTS

This report presents the results of a series of experiments carried out using a large scale physical model of backwater caused by highway stream crossings of wide, heavily-vegetated flood plains. Variables studied included wingwall and spillthrough abutments, spur dikes, prototype bridge openings between 100 and 1100 ft and prototype flows between 8,000 and 36,000 cfs. An important aspect of these experiments was the use of large scale roughness elements protruding the free surface to provide the necessary ranges of roughness to simulate prototype conditions. Five combinations of roughness densities in patterns were tested in the course of experimentation. Primary emphasis was on crossings normal to flow; however, eccentric and skewed crossings were also tested. Results of the study included an analysis of the sensitivity of water surface elevation to the principal variables, quantification of both the local and height of the maximum backwater, and data for possible future study and modification of existing backwater methods. /Author/

This report was sponsored by the Offices of Research and Development, Federal Highway Administration, U.S. Department of Transportation. See also Volume 1 dated Aug 74, PB-244486.

Knepp, AJ Subinski, RP Tseng, MT  
Water Resources Engineers, Incorporated, (WRE 20810) Final Rpt.  
FHWA-RD-75- 52, Apr. 1977, 182 pp, Figs., Tabs., 21 Ref., 1 App.

Contract DOT-FH-11-7669

ACKNOWLEDGMENT: Federal Highway Administration  
ORDER FROM: NTIS

PB-276002/AS

00 169202

#### FEASIBILITY ANALYSIS OF URBAN TRANSPORTATION SYSTEMS WITH SPECIAL REFERENCE TO TUNNELS

Performance-equivalent bus and rail systems were considered under various guideway choices such as dedicated lanes, medians, aerial structures, new rights-of-way, and tunnels. Average per passenger costs were determined for each alternative mode and guideway option. Peak-hour demand was projected for each of the 35 largest metropolitan areas based on analysis of 1970 journey-to-work tables and assumptions on future growth and distribution of population and employment. The decision to prefer tunnels over other choices is highly sensitive to right-of-way costs (property values) and the relative cost of tunnel excavation. If existing property values and

construction costs prevail to 1990, 139 miles of tunnels nationwide are projected, while under more favorable conditions, nearly 400 miles of tunnels were found to be justified. The likelihood of fulfilling the optimistic condition is discussed.

Prepared in cooperation with Ecosometrics, Inc., Bethesda, Md.

Myers, MG Wood, RK Lago, AM Blattenberger, LB  
Systan, Incorporated, Ecosometrics, Incorporated, Transportation  
Systems Center Final Rpt. DOT-TSC-OST-77-47, SYSTAN-D146.1,  
Oct. 1977, 460 pp

Contract DOT-TSC-1075

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274372/2ST, DOTL NTIS

00 169298

#### SYSTEMS ANALYSIS OF RAPID TRANSIT UNDERGROUND CONSTRUCTION. VOLUME I. SECTIONS 1-5

This study describes rapid transit system implementation, design, and construction procedures. The relationships and responsibilities of governmental, private, and public groups involved in planning and implementing an urban rapid transit system are discussed. In this report, techniques and processes of cut-and-cover and tunnel construction are discussed in detail. Environmental impacts of this construction as well as safety and insurance aspects are presented. Physical and institutional controls (sensitivities) on construction are identified. Physical controls include such factors as utility density, traffic conditions, maintaining existing structure integrity, ground conditions, and weather. Institutional controls include the project schedule, right-of-way acquisition, material and equipment supply, and labor agreement and productivity.

Prepared in cooperation with Little (Arthur D.), Inc., Cambridge, Mass. Also available as rept. no. DOT-TST-75-72.I. See also Volume 2, PB-275 568.

Birkmyer, AJ Richardson, DL  
Bechtel Corporation, Little (Arthur D), Incorporated, Transportation  
Systems Center Final Rpt. DOT-TSC-UMTA-75-12.I, Dec. 1974, 177 pp

Contract DOT-TSC-601

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275567/6ST

00 169299

#### SYSTEMS ANALYSIS OF RAPID TRANSIT UNDERGROUND CONSTRUCTION. VOLUME II. SECTIONS 6-9 AND APPENDICES

Three San Francisco Bay Area Rapid Transit (BART) projects and two Washington Metropolitan Area Transit Authority (WMATA) projects are analyzed with respect to time schedules, costs, and sensitivity to physical and institutional controls. These data are utilized in developing generalized models of four specific types of underground construction: cut-and-cover station, cut-and-cover line, free-air-driven tunnel, and compressed-air-driven tunnel. The models presented herein are a planning tool for evaluation of the alternative types of underground construction in a transit system with respect to local costs and physical and institutional controls. Possible future tunneling cost-reduction techniques and recommendations for further research are made. (Portions of this document are not fully legible)

Prepared in cooperation with Little (Arthur D.), Inc., Cambridge, Mass. Also available as rept. no. DOT-TSC-75-72.II. See also Volume 1, PB-275 567.

Birkmyer, AJ Richardson, DL  
Bechtel Corporation, Little (Arthur D), Incorporated, Transportation  
Systems Center Final Rpt. DOT-TSC-UMTA-75-12II, Dec. 1974, 305 pp

Contract DOT-TSC-601

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275568/4ST

00 169548

**SNOW STUDIES. VOLUME 2. 1975-OCTOBER 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)**

The bibliography covers research on snow cover, snowmelt, snowdrifts, snow removal, trafficability, snow rescue and survival, physical and mechanical properties, as well as detection by remote sensing. Applications include construction of roads, runways, buildings, pipe lines, etc., in cold, remote, arctic or subarctic regions. (This updated bibliography contains 185 abstracts, 59 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0809, NTIS/PS-75/719, and NTIS/PS-75/042. See also Volume 1, 1964-74, NTIS/PS-76/0808.

Brown, RJ

National Technical Information Service Nov. 1977, 190 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-77/1005/6ST

00 169746

**SEISMIC INSTRUMENTATION OF TRANSPORTATION TUNNELS IN CALIFORNIA**

The work reported herein was initiated during the spring of 1977, as a limited task in the more comprehensive program on the response of tunnels to earthquakes. The objective has been to provide guidance for an early installment of relatively simple instrumentation in a few selected tunnels in California. The report is composed of three parts. The first part describes suggested instrumentation programs at four different levels of sophistication. For the immediate and initial program at hand, it is foreseen that the first two levels of instrumentation will be employed. The more sophisticated programs have, however, been included to give an appropriate reference frame for the instruments to actually be installed, and also to provide some guidance for possible future installations. The second part lists the criteria that has been used in selecting tunnel sites. The final part contains a description of the tunnels chosen, including a discussion on the geological environment and the tunnel support systems.

Brekke, TL Korbin, GE

Brekke (Tor L), Federal Highway Administration Final Rpt. FHWA/RD-77-138, Aug. 1977, 28 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275457/0ST, DOTL NTIS

00 169764

**CANDE**

No abstract available.

Set includes PB-275 807 thru PB-275 809.

Naval Construction Battalion Center, Federal Highway Administration Oct. 1976; 849 pp, 3 vol.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275806-SET/ST

00 170949

**USE OF PRESTRESSED CONCRETE FOR RAILWAY BRIDGES. EXPERIENCES IN FRANCE AND ABROAD [Ponts-rails en beton precontraint. Experiences francaises et etrangeres]**

Railway bridges built in prestressed concrete give rise to special problems: overloading, track-bridge interaction and effects on the static layout of the bridge and construction methods. This final study report describes a large number of important bridges built on French and foreign railways. [French]

Serre, P

Paris Transport Authority, Ecole Nationale des Ponts et Chaussees SNCF Cat. 53 N41, 1977, 2 pp, Photos., 20 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Paris Transport Authority, 53 Ter. Quai des Grands Augustins, P.O. Box 70-06, 75271 Paris, France Ecole Nationale des Ponts et Chaussees, 28 rue des Saints-Peres, 75007 Paris, France

00 172025

**ANSWER FOUND IN STABILIZATION FABRIC**

Soil stabilization fabric is now installed as a matter of company policy whenever a Florida East Coast mainline grade crossing, railroad crossing,

or turnout is replaced or rehabilitated. The material is also used at other locations where soft track has been or could be a problem, such as bridge approaches or pumping areas in open track. The material and installation procedures are described.

*Railway Track and Structures* Vol. 74 No. 1, Jan. 1978, pp 24-25, 4 Phot.

ACKNOWLEDGMENT: Railway Track and Structures

ORDER FROM: ESL

DOTL JC

00 172029

**CANDE--A MODERN APPROACH FOR THE STRUCTURAL DESIGN AND ANALYSIS OF BURIED CULVERTS**

A unified computer methodology is presented for the structural design, analysis, and evaluation of buried culverts made of corrugated steel, aluminum, reinforced concrete, and a class of plastic pipe. Through proper representation of soil-structure interaction, the engineer can test and evaluate either old or new culvert design concepts. The engineer may select any of three solution levels in the computer program, depending on the complexity of the problem and vigor of solution derived. Level 1 is a closed-form elasticity solution (Burns), whereas levels 2 and 3 are based on finite element methods. Each solution characterizes the culvert-soil system by plain strain geometry and loading. Analytical modeling features incremental construction and non-linear constitutive models for characterizing culvert and soil behavior. Culvert material models account for ductile yielding and brittle cracking. CANDE designs are compared with traditional design solutions for both corrugated metal and reinforced concrete pipe. Field experimental data compared to CANDE predictions demonstrate good condition. /Author/

Sponsored by the Federal Highway Administration, Office of Research. See also PB-275808. Also available in set of 3 reports PC E13, PB-275806-SET.

Katona, MG Smith, JM Odello, RS Allgood, JR

Naval Construction Battalion Center, Federal Highway Administration Final Rpt. FHWA-RD-77- 5, Oct. 1976, 475 pp

Contract I.A.3-1170

ACKNOWLEDGMENT: Federal Highway Administration, NTIS

ORDER FROM: NTIS

PB-275807/6ST

00 172640

**GROUND PRESSURE AND TUNNELLING FROM THE NINETEENTH CENTURY TO THE PRESENT**

The first deep tunnels were the 19th century railway tunnels driven through the Alps--the Frejus or Mount Cenis tunnel between France and Italy (13 km. under a cover of 1,600 m., driven from 1857 to 1866), the St. Gothard between southern Switzerland and northern Switzerland (15 km., cover 1,700 m., 1872-1881) and the Simplon, between Italy and Switzerland (20 km., cover 2,200 m. unsurpassed to the present day, driven in two successive tubes, the first from 1896 to 1906, the second from 1912 to 1921). Pt. 1. Tunnel design; Pt. 2. Tunnel construction.

Duffaut, P *Underground Space* Vol. 1 No. 3, 1977, pp 185-200, Refs.

ORDER FROM: Pergamon Press, Incorporated, Headington Hill Hall, Oxford OX3 0BW, England

DOTL JC

00 172641

**TREATMENT AND MAINTENANCE OF ROCK SLOPES ON TRANSPORTATION ROUTES**

Paper reviews the causes of rock falls and methods of dealing with them in North American and European highway and railway practice. Methods were classified as those that: (a) stabilize slopes or prevent rocks from moving out of place, (b) protect the right-of-way by keeping rocks that do move out of place from reaching the roadway, and (c) warn or signal traffic when rocks arrive at the vicinity of the roadway. Methods of stabilization, protection, and warning are described and illustrated.

Peckover, FL Kerr, JWG *Canadian Geotechnical Journal* Vol. 14 No. 4, Nov. 1977, pp 487-507, Refs.

ORDER FROM: ESL

DOTL JC

00 172936

**COUNTERMEASURES TAKEN BY JNR AGAINST EARTHQUAKES**

In the last hundred years since the beginning of JNR, there have been about twenty earthquakes which have damaged the railway structures. There had been no definite rule on earthquake resistant design before the Kanto earthquake of 1923. In 1930, the design method based on the so-called static seismic intensity was adopted. Various measures of control of train operations both on the Shinkansen and other lines are also outlined.

Nozawa, D (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 20-21, 3 Fig.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

00 172942

**CONSTRUCTION OF TUNNELS FOR THE JOETSU SHINKANSEN**

Japanese National Railways are in the process of building the Joetsu Shinkansen between Tokyo and Niigata on the Sea of Japan. Between these two cities lies the Mikuni Mountain range which separates the Pacific Ocean and the Sea of Japan. To cross these mountains several tunnels are to be constructed. One of them the Dai-Shimizu Tunnel will be the longest in the world, 22 km, and two of the others will be longer than 15 km (Haruna and Nakayama tunnels). This article outlines the methods used in building these tunnels.

Miyazaki, H (Japan Railway Construction Public Corporation) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 4-6, 3 Fig., 2 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

00 172945

**THE CONTRACTOR APPLICATOR: MAN OF MANY PARTS IN VEGETATION CONTROL**

Responsibilities include development of advanced types of spray equipment; training of competent operators; solicitation of contracts; cooperation with producers and railroads in formulation and execution of successful herbicide programs; and compliance with federal, state and local laws and regulations.

Cowart, LE *Railway Track and Structures* Vol. 74 No. 2, Feb. 1978, pp 30-33, 4 Phot.

ACKNOWLEDGMENT: Railway Track and Structures  
ORDER FROM: ESL

DOTL JC

00 173058

**EVOLUTION IN THE PROTECTION OF METAL BRIDGES AGAINST CORROSION [Evolution de la protection anticorrosion des ponts metalliques]**

The evolution in the protection of metal bridges against corrosion during the last five years was influenced by the following factors: (1) prohibition of the use of siliceous abrasives for preparing surfaces which meant that scouring had to be carried out in the factory (and not on site as previously) either just after rolling or in the workshop on finished structural elements. This can lead to long delays between the different applications and to problems of bonding and adhesion for the coats applied on the site; (2) development of paints with a high zinc content with an epoxy or organo-mineral binder instead of the conventional paint containing red lead and glycerophthalic oil or resin, mainly because the new paints are easy to apply and quick to dry; (3) gradual replacement of "bituminous" paints with paints containing coal tar pitch and epoxy resin for the protection of suspension bridge components (cables, suspension rods) and of the parts of the deck which are not visible; (4) adoption of brighter or lighter shades for the top coats of structures. This requires special care in the selection of pigments so that the colour does not change too quickly. /TRRL/ [French]

Mehue, P *Bulletin de Liaison des Lab des Ponts et Chaussees* Analytic No. 87, Jan. 1977, pp 123-129, Photos.

ACKNOWLEDGMENT: TRRL (IRRD 104661), Central Laboratory of Bridges & Highways, France

ORDER FROM: Central Laboratory of Bridges & Highways, France, 58 Boulevard Lefebvre, 75732 Paris, France

00 173059

**USE OF PAINTS WITH A HIGH ZINC CONTENT FOR PROTECTING CIVIL ENGINEERING STRUCTURES AGAINST CORROSION [Utilisation des peintures riches en zinc pour la protection anticorrosion des ouvrages en genie civil]**

Paints with a high zinc content have become extensively used in France for the protection of civil engineering structures over the last few years for technical and economic reasons. Because sanding has been prohibited, scouring has to be carried out in the workshop, thus leading to a complete modification of the planning process on the site, as temporary protection becomes necessary because of delays in covering the metal. For technical and economic reasons, zinc was selected. A brief study is presented of various types of zinc paint used and of their main application to bridges. The results obtained lead to the following conclusions: (1) it is essential that paints with a high zinc content be adequately covered with sealing products; (2) the final result is not improved by increasing the thickness of the zinc layers at the expense of the sealing layers; (3) paints with a high zinc content are an excellent protective system against corrosion and facilitate the planning on site; (4) these products can also be used in thick coats without a cover where they are not visible, e.g. for components not visible in a rural environment. /TRRL/ [French]

Serres, AM *Bulletin de Liaison des Lab des Ponts et Chaussees* Analytic No. 87, Jan. 1977, pp 142-147, 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 104664), Central Laboratory of Bridges & Highways, France

ORDER FROM: Central Laboratory of Bridges & Highways, France, 58 Boulevard Lefebvre, 75732 Paris, France

00 173061

**TUNNELS FOR THE NEW HONG KONG METRO**

Hong Kong will have its first underground railway system in operation by 1980. In the mid 1980's, five interconnected lines will serve 5.5 million people living or working within 30 square miles. By the end of the 1980's it promises to be the most heavily used system in the world. The article describes the background, design and construction of the tunnelling works. /TRRL/

Haswell, CK (Haswell (C) and Partners) *Tunnels and Tunnelling* Analytic Vol. 9 No. 6, Nov. 1977, pp 31-35, 2 Fig., 2 Tab., 6 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 230375)

ORDER FROM: ESL

DOTL JC

00 173062

**SOME ROAD AND RAIL TUNNELS IN JAPAN**

Japan has over 270 km of road tunnels and constructs about 30 km each year on the normal highway system and the national expressway system. Traditional construction methods are being used in the Tsuruga and Yanagase road tunnels in the central area of the country. The rail tunnels in the same region include the 22 km-long Dai-shimizu tunnel which will run from Tokyo through the Tanigawa mountains. The author describes the design and construction methods used on the various tunnelling projects. /TRRL/

Leeney, JG *Tunnels and Tunnelling* Analytic Vol. 9 No. 6, Nov. 1977, pp 38-41, 2 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 230376)

ORDER FROM: ESL

DOTL JC

00 173063

**ROCK CUTTING TOOLS-THEIR ARRANGEMENT ON FULL FACE TUNNEL BORING MACHINES**

In the course of a programme of full and pilot-scale research into rock cutting a method was devised to optimise the layout of cutting tools on the head of a full-face tunnel boring machine. This is achieved by arranging them in such a way that maximum interaction occurs between successive cuts, allowing the full potential of the cutters to be realised, which in turn can either improve excavation rates or, since cutting forces can be reduced, prolong tool life. Estimates of the performance of a multi-tool array on the head of a rock cutting machine are at present obtained by extrapolation of test results on single rock-cutting tools. To apply these results to the field



situation, consideration must be given to the constraints of operation that this situation imposes; two major constraints from a rock-cutting point of view are head rotational speed and machine advance rate; other important design considerations are primary debris clearance, machine torque and thrust. Having devised a method for determining tool layout on the cutting head at a particular cutting head speed and advance rate, nomograms have been prepared that relate to the cutting head layout both machine rate of advance and cutting head speed. Consideration in this article is only given to the two most commonly used rock cutting tools, namely drag picks and discs but the method could equally well be applied to most other types of rock cutter. /TRRL/

O'Reilly, MP Hignett, HJ (Transport and Road Research Laboratory) *Chartered Mechanical Engineer Analytic* Vol. 24 No. 3, Mar. 1977, pp 47-51, 14 Fig., 8 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230446)

ORDER FROM: ESL

DOTL JC

00 173147

**DEVELOPMENT OF A MECHANICAL DEVICE WITH A BUILT-IN SHIELD FOR BORING TUNNELS WITHOUT PILES**  
[Sozdanie otecestvennogo mehanizirovannogo scita dlja bezkessonnoj prohodki tonnelej]

No Abstract. [Russian]

Vlasov, SN *Transportnoye Stroitel'stvo* No. 1, Jan. 1978, pp 14-15, 1 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

00 173152

**ALTERNATIVE FORECAST MODEL FOR SNOWDRIFT AVALANCHES IN THE Khibiny Mountains**

Discriminant analysis of synoptic conditions leading to the fall of snowdrift avalanches in the Khibiny Mountains in the USSR is used to obtain empirical quadratic discriminant functions. These functions are used to construct a decision rule for recognition of storm and hurricane synoptic situations in this region. Testing of the decision rule on independent diagnostic material gave good results.

Polkhov, AP (Arctic & Antarctic Scientific-Research Inst, USSR) *Soviet Meteorology and Hydrology* No. 10, 1976, pp 58-63, 11 Ref.

ACKNOWLEDGMENT: EI

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00 173376

**PROFESSOR RINNER'S CLEARANCE GAUGE MEASURING DEVICE: CONSTRUCTION, PRINCIPLE AND POSSIBLE APPLICATIONS** [Lichttraumessgeraet nach Prof. Rinner, Aufbau, Prinzip und Anwendungsmoeglichkeiten]

The Kassel firm of Breithaupt was commissioned by the DB to develop clearance measuring equipment, and in 1972 designed an instrument which was an extension of the first experimental device based on Rinner's work. The device works with a laser beam, the two halves of which are directed onto a fixed prism and a moving prism, and overlap in front of the lens. The device is used to measure the structure gauge in tunnels, and also to measure clearance (gauge for masts, ramps and roofs). It is 50% more efficient than the present test vehicle. A new improved version of this instrument is being manufactured in series on a production line. [German]

VII-Int'l Kurs Ingenieurmess hoher Praez-Band II 1977, pp 729-732

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VII-Int'l Kurs Ingenieurmess hoher Praez-Band II, Darmstadt, West Germany

00 173391

**MECHANICAL PRECUTTING: A NEW PROCESS FOR TUNNEL DIGGING** [Le predecoupage mecanique: un procede nouveau pour le creusement des tunnels]

This process, which avoids soil decompression when excavation is being carried out, and takes maximum advantage of the natural arch effect, was used by the RATP (Paris Transport Authority) in recent drilling operations. It is extremely safe, quick and suitable for use in difficult terrain, and cost-wise is highly competitive. [French]

See also No. 23, pp 202-210 (September-October 1977) and No. 24, pp

264-272 (November-December 1977).

Bougard, JF *Tunnels et Ouvrages Souterrains* No. 22, July 1977, pp 174-180, 2 Tab., 38 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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00 173399

**NO EASY WAY OUT WHEN 3-TRACK TGB BRIDGE IS DEMOLISHED**

Problems encountered and fast work required to overcome them when derailment caused Burlington Northern span on Chicago Line to be dumped onto tracks below are discussed. The problems came about because the derailment resulted in the virtual destruction of a three-track, through-girder bridge carrying the line across four tracks of the Indiana Harbor Belt.

*Railway Track and Structures* Vol. 73 No. 10, Oct. 1977, pp 19-23

ACKNOWLEDGMENT: EI

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00 173400

**EXAMPLES OF THE BEHAVIOR OF SHOTCRETE LININGS UNDERGROUND**

The paper presents examples and general observations of the use of shotcrete based on its application in a number of different tunnels and permanent underground openings in Norway. Shotcrete linings of varying lengths are to be found in railway, highway, water supply and sewage tunnels, but first of all in hydro power tunnels. Shotcrete is also used in a number of different underground rooms for lining and supporting. Shotcrete linings are often regarded as an alternative to concrete linings cast in place. Hence these two types of support have to be carefully compared in cost, quality and flexibility. This will often set a limitation on the use of shotcrete. When determining the permanent support of a tunnel one has not only to consider the cost and the type of stability problem, but also different circumstances concerning the prospective use of the tunnel. Furthermore, the physical and mechanical conditions for a tunnel often change after it is in use. Among the applications discussed are underground openings in dry conditions and temperatures above freezing, openings exposed to freezing and thawing, water tunnels in swelling clay and in crushed zones exhibiting squeezing.

Shotcrete for Ground Support, Proc of the Eng Found Conf, Easton, Md, October 4-8, 1976.

Selmer-Olsen, R (Trondheim University, Norway)

American Society of Civil Engineers, American Concrete Institute Proceeding ACI Publ n SP-54, 1977, pp 722-733

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE, American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan, 48219

00 173402

**BEHAVIOR DURING CONSTRUCTION OF THE DUPONT CIRCLE SUBWAY STATION LINING**

The paper reports on the results of an instrumentation program conducted during construction of the station in Washington, D.C. The primary objective of this study was to evaluate the short-term performance of the lining for a large, shallow underground opening in rock. Lining behavior was evaluated with respect to induced moment, thrust, and deflection. The instrumentation program was conceived to verify assumptions made in lining design and to provide insight into procedures for designing and constructing thick, permanent shotcrete linings. Among the subjects discussed are rock mass geology at the project site, construction sequence and the instrumentation program, measured behavior of the station and a comparison of the measured behavior with the results of a stress analysis of the lining.

Shotcrete for Ground Support, Proc of the Eng Found Conf, Easton, Md, October 4-8, 1976.

Brierley, GS (Haley & Aldrich, Incorporated); Cording, EJ

American Society of Civil Engineers, American Concrete Institute Proceeding ACI Publ n SP-54, 1977, pp 675-712

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE, American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan, 48219

00 173403

**SOFT GROUND TUNNEL FOR THE MUNICH METRO**

The paper discusses the extension of Section 9 of the Munich Metro located at Sendlinger Tor Platz in downtown Munich, using the New Austrian Tunneling Method. Among the topics discussed are location, geological conditions and geotechnical problems, soil mechanics, tunnel design considerations, structural analysis, and construction work realized in the field.

Shotcrete for Ground Support, Proc of the Eng Found Conf, Easton, Md, October 4-8, 1976.

Laabmayr, F

American Society of Civil Engineers, American Concrete Institute Proceeding ACI Publ n SP-54, 1977, pp 352-372

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE, American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan, 48219

00 173406

**NEW CRANE/PILE-LEAD COMBINATION IN USE ON NORTH WESTERN**

Rig consisting of equipment with many new features as used in operation driving piles on branch-line trestle in Iowa is described.

*Railway Track and Structures* Vol. 73 No. 10, Oct. 1977, pp 30-31

ACKNOWLEDGMENT: EI

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00 173409

**PRINCIPLES AND APPLICATIONS OF INJECTION [Principes et applications de l'injection]**

The study described reviews the problem of soil injection. The main characteristics are indicated (suitability for decanting, time of setting, viscosity, rigidity) for the main types of slurry: unstable, stable, liquid, foam-slurry. Their modes of action are analyzed, by impregnation or by bursting. On the basis of these data are determined the criteria of choice of slurry to use in terms of the medium to be processed (split rock or sands and gravels) and of objective sought: drying up, consolidation, filling of large cavities, lifting of a structure. A certain number of examples of application of injections is presented concerning in particular the treatment of pressure tunnels, the filling of large cavities and the lifting of a structure. [French]

Cambefort, H (Ponts et Chaussées, France) *Annales de l'Institut Tech du Batiment Travaux Pub* No. 353, Sept. 1977, pp 1-23, 12 Ref.

ACKNOWLEDGMENT: EI

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00 173413

**DISPLACEMENTS IN TUNNEL AREAS IN SOFT SOIL [Les déplacements autour des tunnels en terrain tendre]**

In this account, delivered to the Panamerican Soil Mechanics Congress in November 1975, the authors traced for the first time lines of equal distortion and equal volume variations above the arch of a shield-drilled tunnel, by using measurements obtained from multiple-layer tassometers and inclinometers. The concepts of the shoring-up effect and of the free support dome on the arch are given practical and precise expression by means of diagrams.

See also No. 23, pp 221-227 (September-October, 1977) and No. 24, pp 243-250 (November-December, 1977).

Cording, EJ Hansmire, WH *Tunnels et Ouvrages Souterrains* No. 22, July 1977, pp 181-192, 7 Tab., 20 Phot., 37 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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00 173414

**A SUMMARY OF RESEARCH ON THE DYNAMIC INCREASE COEFFICIENT TO BE USED IN RAILWAY BRIDGE****CALCULATIONS [Resume des recherches sur le coefficient de majoration dynamique a utiliser dans le calcul des ponts-rails]**

Conditions for the use of conventional methods of calculating resistance of materials, taking into account impact stresses and load displacement speeds. Introduction of the dynamic effects of loads in the regulations. Parameters affecting the dynamic phenomenon in railway bridges. Research carried out by the UIC's Office for Research and Experiments: summary and proposals.

Individual research projects: theoretical study and calculation programme. Conclusion. [French]

Pignet, P Girardi, L *Travaux* No. 513, Nov. 1977, pp 47-52, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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00 173425

**IMPROVEMENTS IN TUNNEL CONSTRUCTION****[Soversensstvovanie stroitel'stva transportnyh tonnelej]**

The article gives statistical data on the length of various tunnels put into operation in the USSR over recent years. It also discusses ways of improving construction and speeding up drilling of tunnels, with special reference to gantries, drilling and concrete-injecting equipment, workshop wagons, rapid-assembly metal arches and other high-performance equipment. [Russian]

Koselev, JA Vlasov, SN *Transportnoye Stroitel'stvo* No. 11, Nov. 1977, pp 17-21, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

00 173426

**BRIDGE SPANS MADE OF CONCRETE SLABS WITH FLEXIBLE EXPANSION JOINTS [Plitnye temperaturno-nerazreznye proletnye strojenija]**

No Abstract. [Russian]

Stil'man, EI Barsukov, VP *Transportnoye Stroitel'stvo* No. 12, Dec. 1977, pp 10-11, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

00 173432

**MUD TREATMENT BY COMPACTION AND SIEVE PRESS. THE DB'S PILOT PLANT NOW OPERATIONAL****[Klaerschlammaufbereitung durch Eindickturm und Siebbandpresse.****DB-Pilotanlage fertiggestellt]**

Mud elimination is causing an increasing number of environmental and financial problems and this description of the theoretical principles of mud drainage, is followed by evidence that optimum cost conditions for mud elimination may be created by use of a sieve press, this evidence emerging from the Bremen repair workshop's mud treatment installation which is a German Federal Railway pilot scheme. [German]

Klueve, R *Eisenbahningenieur* Vol. 28 No. 10, 1977, pp 405-415, 3 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 173551

**APPLICATION OF SHOTCRETE IN THE NATM (OPERATING EQUIPMENT, PAYMENT PROVISIONS AND PRACTICAL EXAMPLE)**

The New Austrian Tunneling Method (NATM) is a double shell building method consisting of a shotcrete outer arch (reinforced by welded wire fabric and steel rib sections) and a systematically anchored rock carrying ring. The rock carrying ring is the primary supporting element and thus of the greatest importance. The advantages of shotcrete in the NATM lie primarily in its good applicability in sealing exposed cavities as fast as possible and thereby avoid detrimental loosening around the rim of the cavity; besides, it provides immediate protection for the crews. In the rock conditions encountered at the Arlberg West tunnel there was, however, a critical rigidity of the shotcrete outer arch. If said critical point was surpassed, shear fractures were the result. This rigidity of the shotcrete outer arch could be avoided by a methodical placement of contraction slots (fault slots) which keep the shotcrete shell from being destroyed. The paper discusses the excavation method used at the Arlberg West tunnel and the operational equipment used for applying shotcrete.

Proceedings of the Engineering Foundation Conference, Easton, Maryland, October 4-8, 1976.

Mayrhauser, W (Arlberg Tunnel Consortium, Austria)

American Concrete Institute Proceeding ACI Pub SP-54, 1977, pp 297-322

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 173554

#### CONCEPTUAL SUBSTRUCTURAL SYSTEMS FOR SHORT-SPAN BRIDGES

Systems approach for abutments of short-span bridges is presented. Ten different systems have been analyzed in detail with a view toward ease of erection, economy, maintenance, longevity, efficiency, versatility, etc. Reinforced earth, gabions, segmental plank, cellular box, steel bent, driven steel pile bent, concrete bent, stub system, concrete and timber cribbing are reasonable suggestions for short-span bridge abutments. Depending upon the merits and demerits gabions, concrete bent, cellular box, segmental plank and timber cribbing appear to be best suited from the industrialized construction viewpoint.

GangaRao, HV *ASCE Journal of Transportation Engineering* Vol. 104 No. 1, Jan. 1978, pp 1-13

ACKNOWLEDGMENT: EI  
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DOTL JC

00 173570

#### SHOTCRETE FOR GROUND SUPPORT

The Proceedings contain 39 papers presented at the Conference. Papers are arranged under the following session readings: materials, field control, equipment and processes, payment provisions, design, code histories and performance. Case history examples include applications of shotcrete support in highway tunneling, subway stations, hydroelectric power tunnels, shaft sinking, and in the U. S., Europe and Latin America. Selected papers are indexed separately.

Proceedings of the Engineering Foundation Conference, Easton, Maryland, October 4-8, 1976.

American Concrete Institute, American Society of Civil Engineers Proceeding ACI Pub SP-45, 1977, 766 pp

ACKNOWLEDGMENT: EI  
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00 173573

#### WHY DO BRIDGES FAIL?

From the study of 143 bridge failures that occurred throughout the world from 1847 to 1975, it is found that there are nine categories of failure. The most frequent of these is failure due to flooding, because a single flooded river can destroy a whole series of bridges along its course. Other categories are brittle fracture, earthquake and wind failures, accidental destruction, falsework and steel box girder failures, and failures caused by corrosion and fatigue. For each category, one or more case histories is cited and discussed.

Smith, DW (Dundee University, Scotland) *ASCE Civil Engineering* Vol. 47 No. 11, Nov. 1977, pp 58-62

ACKNOWLEDGMENT: EI  
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00 173596

#### FUNDAMENTAL STUDY ON THE EARTHQUAKE RESISTANCE DESIGN FOR CAISSON FOUNDATIONS OF BRIDGES

In order to investigate the behavior of caisson foundations against static and dynamic forces, tests were conducted in seven kinds of small-sized reinforced concrete caissons at Sakura. From these tests results, the methods of analysis on linear or bilinear relation between static horizontal force and the displacement of a caisson and on its ultimate bearing capacity were introduced. Moreover, dynamic analysis of a caisson, considering the interaction with soils around it was developed and verified using the observations data of earthquakes at Sakura and the Chikumagawa Railway Bridge.

Tamura, K *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Rpt No. 1000-76, Sept. 1977, pp 98-104, 9 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

00 173602

#### USE OF PLASTICS IN DAMP-PROOFING RAILWAY BRIDGES

Plastics are used in bridge-building as joint sealing materials, webs and coating materials. In principle, polysulphide rubber base materials have proved useful for sealing expansion joints. Flexible suspension PVC webs have successfully been installed against soil moisture and infiltration water for about 20 years. In solid and steel sub-bases with ballast bed reactant-type resin base coatings serve both as sealing and protection against corrosion, and also as protective layer. Laboratory tests were made and experimental structures were coated. [German]

Schulze, D Zibbat, H *DET Eisenbahntechnik* Vol. 25 No. 12, Dec. 1977, pp 496-498

ACKNOWLEDGMENT: British Railways  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

00 173814

#### EPOXY INJECTION SOLVES UNIQUE PIER PROBLEM

Crushing of the concrete under the bearing plates of piers of Burlington Northern bridge over Wisconsin River alerted the railroad to other problems including cracks developing in the dense outer concrete shells. For repair BN sealed the surface cracks and consolidated low-density interior materials by pumping resin mix into cracks and in vertical and horizontal holes in which reinforcing bars had been inserted.

*Railway Track and Structures* Vol. 74 No. 3, Mar. 1978, pp 38-39, 1 Phot.

ORDER FROM: ESL

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00 174019

#### ADVANCED EXCAVATION METHODS

Novel excavation systems remove rock by four basic mechanisms: (1) melting and vaporization; (2) thermal spalling; (3) mechanical breakage, and (4) chemical reactions. The energy required to remove rock by these novel systems is much greater than that for conventional excavations; consequently, these novel systems will find widespread application only in conjunction with conventional drills and excavators. In this case the novel devices will be used to cut slots or holes in the rock, thereby weakening the rock and enhancing the conventional rock removal system. Lasers and electron beams have demonstrated that they can effectively cut narrow kerfs in rocks, but improved focusing systems will be required before they find widespread application. Rocket drills and electric drills currently being developed drill some hard rocks faster than conventional drills. Explosive drills being developed indicate potential for drilling granite and other hard rocks at rates up to 36 metres per hour. New systems for changing the bit cutting elements in deep wells without pulling the drillstem from the hole are under development. High pressure water jet drills and tunnelling machines have indicated potential for drilling and excavating 2 to 5 times faster than conventional systems. As a result of the extensive work underway, it appears that some of these novel excavation systems will find commercial application within the next two years.

Maurer, WC (Maurer Engineering) *Underground Space Analytic* Vol. 2 No. 2, Dec. 1977, pp 99-112, 24 Fig., 1 Tab., 13 Phot., 31 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230946)  
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

00 174020

#### PREFABRICATED PRESTRESSED CONCRETE BRIDGES ON THE BELGRADE-BAR RAILWAY [Prefabricirani prednapregnuto-betonski mostovi na željeznickoj pruzi beograd-bar]

Four out of ninety eight bridges on a 116.9 km railway section between Gostum and Titograd are made of prefabricated prestressed concrete beams. All four structures were constructed by means of a launching device of domestic design and manufacture. The launching device MZM 30/500 can be used in erecting prefabricated bridge beams with a span of up to 30 M long and up to 500 T in weight. This device enabled the designers to change the original design intended for these bridges and use prefabricated prestressed concrete instead. The illustrations give details of the bridge. Data on all the bridges forming this section are given in a table. [Croatian]

Milicic, M *Gradjevinar Analytic* Vol. 29 No. 10, Oct. 1977, pp 382-391, 10 Fig., 1 Tab., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 231298)

ORDER FROM: Savez Gradjevinskih Inzenjera i Technicara, Berislaviceva Ulica 6, Zagreb, Croatia, Yugoslavia

00 174021

#### PLANNING AND ITS IMPORTANCE IN REDUCING THE COST OF URBAN TUNNELS

Planners can significantly increase the utilization of underground space for transportation, water, sewage, and utility services through better understanding of the effect of geology and construction depth on the cost of underground construction. Planners should realize that construction in soft, near-surface soil in many urban areas is first expensive and second requires underpinning of existing structures, utility relocation, and restoration of city street activities that can cost more than the original tunnel. On the other hand, planners should realize that competent rock exists at reasonable depths under most urban areas in which tunnel boring machines or even conventional drill and blast methods can be used to advance relatively economical tunnels at very fast rates. Such deep tunnels in rock do not require the relocation of utilities, the underpinning of structures or street restoration. Moreover, vertical access to deep tunnels in good construction materials is not prohibitive in cost and can be made to be acceptable to the public. For example, access to a 50 M deep tunnel is equivalent to vertical access via an express elevator to the 14th story of a high rise building. Cost estimates of underground tunnelling in a typical urban area such as Chicago have shown that the basic cost of construction of a cut-and-cover tunnel is in the order of \$13400/M, while the cost of an equivalent tunnel in rock below the surface is in the order of \$3800/M. The cost for the vertical access to the deep tunnel is more than offset by the highly variable cost of underpinning, utility relocation and restoration which can more than double the cost of shallow tunnels. Clearly, the economics of deep tunnels to provide urban services points to an innovative alternative for providing underground space under U.S. urban areas.

Silver, ML Peters, JF (Illinois University, Urbana) *Underground Space Analytic* Vol. 2 No. 2, Dec. 1977, pp 65-79, 12 Fig., 4 Tab., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230943)

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

00 174022

#### RESEARCH AND DEVELOPMENT NEEDS FOR SYSTEMS AND MANAGEMENT IN UNDERGROUND TRANSPORTATION CONSTRUCTION

Relative to other sectors of the U.S. economy, construction is experiencing a higher rate of inflation, technological stagnation, and a decreasing physical share of the gross national product. This at least in part results from the lack of incentives for and activity in research and development. This paper focuses primarily upon the consequent problems faced in urban transportation construction. At this stage it appears that some of the major obstacles that impact costs, slow productivity and inhibit the implementation of innovations result from: (1) decisions made and policies set during the planning and design phases; and (2) the contractual and organizational structure chosen for project administration. There are also major opportunities for improvements through wider and more effective use by construction contractors of existing methodologies and management techniques that have already proven to be successful. Changes in all of these areas are necessary if the limited amount of research now being done is to have any major impact through implementation.(a)

Paulson, BC (Stanford University) *Underground Space Analytic* Vol. 2 No. 2, Dec. 1977, pp 81-89, 3 Fig., 2 Tab., 41 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230944)

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

00 174023

#### MATERIALS HANDLING RESEARCH FOR TUNNELLING

Recent research at the Colorado School of Mines has focused on the materials handling problem of muck haulage in rapid transit tunnels. For the muck rates projected within the next decade, high-volume transportation modes will be required. Hydraulic and pneumatic pipelines appear attractive as high capacity haulage systems serving a confined space. Slurry pipelines are examined here in detail with special reference to muck preparation, extensible conveyor systems, slurry pipelining, and slurry dewatering.

Pipeline efficiency and reliability depend on a controlled particle size and distribution. Therefore, some crushing of the muck will be necessary. A simple means for temporarily extending the transport system between muck preparation and slurry pipeline is necessary for high capacity-continuous operation. Assuming that the slurry water is recycled to the tunnel face, dewatering schemes must be considered. Technical feasibility is demonstrated in these areas.

Faddick, RR Martin, JW (Colorado School of Mines) *Underground Space Analytic* Vol. 2 No. 2, Dec. 1977, pp 121-127, 5 Fig., 5 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230947)

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00 174026

#### THE STOCKHOLM UNDERGROUND

The paper summarizes the drill-and-blast techniques of excavation used in constructing the underground railway public transport system of Stockholm. The Stockholm Tunnelbana now totals 110 km of rail including 53 km in rock tunnels. The paper treats drill-and-blast methods, stability requirements, methods of controlled blasting to obtain stability and avoid damage to structures, and methods and requirements for ground water control in urban areas. Recent underground stations on the Jaerva line have been given a new design in which the traditional cast concrete ceiling has been discarded. The rock ceiling is exposed by a thin (7.5-10 cm) layer of reinforced shotcrete only. In some station walls the bare beautiful rock surface itself is exposed and is utilized as a decorative work of art. The number of the covering abstract of the conference is IRRD 231024.

Pettersson, B

Statens Raad foer Byggnadsforskning *Analytic* Vol. D No. 3, Document D3:1977, 1977, pp 189-203, 8 Fig., 7 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 231022), National Swedish Road & Traffic Research Institute

ORDER FROM: Statens Raad foer Byggnadsforskning, Box 27063, Stockholm, Sweden

P 0429

00 174027

#### THE HEITERSBERG TUNNEL

The author reports in detail on boring a 2600 M long 10.67 M diameter railway tunnel through sandstone, silt and marl. Precast concrete segments were placed in the tunnel invert immediately behind the cutter head, and a first concrete lining was applied to the rest of the circumference of the tunnel using an automatic concrete spraying machine following a very short distance behind the boring machine. Daily advance in a 2 shift day was 8 M, using roof-bolts and wire mesh reinforcement, or 3.6 M in the quarter of the tunnel length where steel rib support was used. The number of the covering abstract of the conference is IRRD 231024.

Prader, D

Statens Raad foer Byggnadsforskning *Analytic* Vol. D No. 3, Document D3:1977, 1977, pp 205-210

ACKNOWLEDGMENT: TRRL (IRRD 231023), National Swedish Road & Traffic Research Institute

ORDER FROM: Statens Raad foer Byggnadsforskning, Box 27063, Stockholm, Sweden

P 0429

00 174031

#### DIMENSIONING, USING ECONOMIC CRITERIA, OF TUNNEL LINING BY MEANS OF A PARTIALLY RANDOMIZED MODEL [Dimensionamento con criteri economici del rivestimento delle gallerie mediante modello a casualizzazione parziale]

A partially randomized model of tunnel lining using economic criteria is proposed. The randomization is obtained by taking as random variables the mechanical characteristics of the terrain. The model proposed makes it possible to rationalize the choices of thickness, in relation to the wider context situations, which also take into account the importance of the railway line as well as the type and form of information regarding the characteristics of the terrain. [Italian]

Liuzzi, R Mele, A *Ingegneria Ferroviaria* No. 7-8, July 1977, pp 595-602

ACKNOWLEDGMENT: EI

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DOTL JC



00 174731

**PROCEEDINGS OF WORKSHOP ON MATERIALS HANDLING FOR TUNNEL CONSTRUCTION HELD AT KEYSTONE, COLORADO ON AUGUST 3-5, 1977**

With the anticipated increases in tunnel construction in the next decade greater demands will be made on transportation systems to remove tunnel muck at rates consistent with tunnel excavation rates. Conventional materials-handling systems such as rail, rubber-tire vehicles, and conveyors will have to expand their capabilities. Simultaneously, hybrid and lesser known systems such as pneumatic and slurry pipelines must be considered as potential systems for muck haulage, particularly since they show substantial promise of being capable of transporting the muck volumes projected for the next decade. A workshop entitled, 'Materials Handling for Tunnel Construction', was held August 3, 4, 5, 1977 at Keystone, Colorado. Experts were invited from the construction, metal and non-metal mining industries. The participants evaluated the state of the art of materials-handling systems for underground construction, exchanged information on current systems applications and research, itemized research needs, and produced a written summary of their conclusions. This report comprises the proceedings of the workshop.

Sponsored in part by Transportation Systems Center, Cambridge, Mass. and Urban Mass Transportation Administration, Washington, D.C. Office of Rail Technology.

Faddick, RR Martin, JW

Colorado School of Mines, Transportation Systems Center, Urban Mass Transportation Administration DOT-TSC-UMTA-97-50, Aug. 1977, 291 pp

ACKNOWLEDGMENT: NTIS

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PB-276602/OST

00 174740

**A NEW SENSING SYSTEM FOR PRE-EXCAVATION SUBSURFACE INVESTIGATION FOR TUNNELS IN ROCK MASSES. VOLUME I. FEASIBILITY STUDY AND SYSTEM DESIGN**

This report includes a feasibility study and system design for an initial prototype of a sensing system for pre-excavation subsurface investigation for tunnels in rock. Tunnels in rock are very expensive, and costs often rise far above estimates when unforeseen problems are encountered during excavation. New techniques in rapid excavation technology, such as the development of boring machines, have increased the need for improved site investigation. Possibilities for a new sensing system that will provide more complete data on subsurface conditions were investigated. Favorable results obtained from high-resolution geophysical sensing in boreholes have been combined with improvements in drilling of long, horizontal, precise boreholes in order to provide an economical alternative to pilot tunnel for subsurface investigation. Pilot tunnel costs as with all subsurface construction are rising at rates much higher than the economy, thus the use of borehole site investigation has potentially very high benefit/cost characteristics. The prototype system designed is a highly mobile geophysical measurement (data acquisition) system. The system will take electromagnetic radar measurements, pulsed acoustical measurements, and multi-spaced array resistivity measurements. The sensors will be used in traverses along the borehole, and data will be taken and stored on magnetic tape for subsequent reduction and analysis at a computational center. The system could reduce accidents, reduce bid contingencies, and reduce other factors contributing to rapid escalating costs of subsurface excavation. Volume I describes the feasibility study and system design. Volume II contains the Appendices A-R.

See also Vol. 2, PB-276 721.

Rubin, LA Fowler, JC Griffin, JN Still, WL

ENSCO, Incorporated, Federal Highway Administration Final Rpt. FHWA-RD-77- 10, 1061-TR-3-1-Vol-1, Aug. 1976, 206 pp

Contract DOT-FH-11-8602

ACKNOWLEDGMENT: NTIS

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PB-276720/OST, DOTL NTIS

00 174741

**A NEW SENSING SYSTEM FOR PRE-EXCAVATION SUBSURFACE INVESTIGATION FOR TUNNELS IN ROCK MASSES. VOLUME II. APPENDICES: DETAILED THEORETICAL, EXPERIMENTAL AND ECONOMIC FOUNDATION**

Contents: Theoretical studies-(Alternatives considered for a feasible baseline system, Rock characteristics of significance in tunneling, Range and resolution, Acoustic wave propagation in hard rock, Acoustic sensing system, Ground-probing radar, Electrical resistivity, Signal processing techniques applicable to subsurface investigation of rock masses through boreholes, Conceptual design of hard rock sensor conveyance device, Applicability of drill rigs as propulsion devices); Critical laboratory experiments-(Studies of geo-engineering properties of rock related to the use of radar and sonar probing systems, Transverse-dipole borehole antennas, Subsurface experiments with radar); Economic considerations-(Comparative study of probabilities of success of candidate system design concepts, Economic analysis of the full-capability system, Cost of pilot tunnels, Analysis of sensing cost-benefit ratios as functions of borehole size, Cost-effectiveness considerations for propulsion and penetration).

See also Vol. 1, PB-276 720.

Rubin, LA Fowler, JC Griffin, JN Still, WL

ENSCO, Incorporated, Federal Highway Administration Final Rpt. FHWA-RD-77- 11, 1061-TR-3-1-Vol-2, Aug. 1976, 505 pp

Contract DOT-FH-11-8602

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PB-276721/8ST, DOTL NTIS

00 175271

**DEVELOPMENT OF RESEARCH IN THE CONSTRUCTION OF TRANSPORTATION FACILITIES: A STUDY OF NEEDS, OBJECTIVES, RESOURCES, AND MECHANISMS FOR IMPLEMENTATION**

The report describes an in-depth research study to (1) evaluate and quantify the current and projected state of productivity in the construction of transportation facilities; (2) determine areas having the highest potential economic returns and the greatest needs where research could lead to improvements in technology and management that in turn could lead to improved productivity; quantify decisionmaking criteria where possible; (3) assess the present and potential interests and capabilities of institutions-universities in particular-that would do such research in transportation construction; and (4) explore improved mechanisms for implementing transportation construction innovations. Some of the major obstacles that impact costs, slow productivity and inhibit the implementation of innovations result from (1) decisions made and policies set during the planning and design phases; and (2) the contractual and organizational structure chosen for project administration. There are also major opportunities for improvements through wider and more effective use by construction contractors of management techniques that have already proven to be successful.

See also PB-277420 in RRIS 00 175272; Bulletin 7802.

Paulson, BC Fondahl, JW Parker, HW

Stanford University, Department of Transportation Final Rpt. DOT/RSPD/DPB/50-7713, TR-223, Sept. 1977, 161 pp

Contract DOT-OS-60150

ACKNOWLEDGMENT: NTIS

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PB-277419/8ST, DOTL NTIS

00 175272

**DEVELOPMENT OF RESEARCH IN THE CONSTRUCTION OF TRANSPORTATION FACILITIES: A STUDY OF NEEDS, OBJECTIVES, RESOURCES, AND MECHANISMS FOR IMPLEMENTATION. SUMMARY REPORT**

Specific objectives for the study included the following: (1) Evaluate and quantify the current state of productivity in the construction of transportation facilities; (2) determine areas having the largest potential economic returns and the greatest needs where research could lead to improvements in technology and management for improved productivity; (3) assess present and potential interests and capabilities of institutions and individuals that could do such research in transportation construction; (4) explore incentives and improved mechanisms for implementing findings that would result from

expanded research efforts; (5) develop means for evaluating the impact that policy, contractual and technical decision-making in the planning and design stages has on capital costs in the construction phase.

See also PB-277419 in RRIS 00 175271; Bulletin 7802.

Paulson, BC Fondahl, JW Parker, HW  
Stanford University, Department of Transportation Final Rpt.  
DOT/RSPD/DPB/50-7714, TR-224, Sept. 1977, 32 pp

Contract DOT-OS-60150

ACKNOWLEDGMENT: NTIS  
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PB-277420/6ST, DOTL NTIS

#### 00 175475

##### TECHNIQUE FOR ESTIMATING MAGNITUDE AND FREQUENCY OF FLOODS IN TENNESSEE

Information is presented for estimating the magnitude and frequency of floods on natural streams in Tennessee. Flood-frequency characteristics are defined for 281 gaging stations in Tennessee and adjoining states having 10 or more years of record not significantly affected by man-made changes. The frequency characteristics were related to basin characteristics by multiple regression techniques and the equations derived can be used to estimate the magnitude of future floods with recurrence intervals as much as 100 years on ungaged streams if contributing drainage area of the site is known. At or near gaged sites, a weighted average of the regression results and the gaging station data is recommended.

Randolph, WJ Gamble, CR  
Geological Survey, Federal Highway Administration Prog. Rpt.  
FHWA/TN-76-0207, 1976, 62 pp

ACKNOWLEDGMENT: NTIS  
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PB-277784/5ST

#### 00 175543

##### MUCK UTILIZATION IN URBAN TRANSPORTATION TUNNELING PROCESS

The purpose of this study is to develop a workable approach to muck utilization for transit tunnels, including cut and cover construction, in the urban area. This report presents the results of a detailed investigation into the potential for muck utilization in the urban transportation tunneling process, and it documents the necessary technical and planning procedures that may be used to evaluate its utilization. This report provides transportation system planners and engineers with the necessary information to use more efficiently the earth and rock materials produced during excavation for transportation tunnels and large excavations. Six guideline steps for muck utilization planning are presented as well as the selection of a Muck Utilization Coordinating Committee (MUCC) for implementing these guideline steps. The muck utilization planning concepts were investigated for three U.S. cities (case studies): Atlanta, Georgia; Chicago, Illinois; and Baltimore, Maryland. Additionally, a trial case study of the muck utilization guidelines was made for the Baltimore Rapid Transit System.

Liu, TK Gifford, DG Stulgis, RP Freed, DL  
Haley and Aldrich, Incorporated, Transportation Systems Center Final Rpt.  
DOT-TSC-UMTA-77-34, Dec. 1977, 378 pp

Contract DOT-TSC-836

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278066/6ST

#### 00 175688

##### TECHNIQUE FOR ESTIMATING MAGNITUDE AND FREQUENCY OF FLOODS IN ILLINOIS

A technique is presented for estimating flood magnitudes at recurrence intervals ranging from 2 to 500 years, for unregulated rural streams in Illinois, with drainage areas ranging from 0.02 to 10,000 square miles (0.05 to 25,900 square kilometers). Multiple regression analyses, using streamflow data from 241 sampling sites, were used to define the flood-frequency relationships. The independent variables drainage area, slope, rainfall intensity, and an areal factor are used in the estimating equations to determine flood peaks. Examples are given to demonstrate a step-by-step procedure in computing a 100-year flood for a site on an ungaged stream, and a site on a gaged stream in Illinois.

Prepared in cooperation with Illinois State Div. of Highways, Springfield.

Curtis, GW

Geological Survey, Illinois State Division of Highways Final Rpt.  
USGS/WRD/WRI-78/009, USGS/WRI-77-117, July 1977, 78 pp

ACKNOWLEDGMENT: NTIS  
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PB-277255/6ST

#### 00 175897

##### FREQUENCY ANALYSIS OF ILLINOIS FLOODS USING OBSERVED AND SYNTHETIC STREAMFLOW RECORDS

Equations, applicable statewide, for estimating flood magnitudes having recurrence intervals ranging from 2 to 500 years for unregulated rural streams, with drainage areas ranging from 0.02 to 10,000 square miles (0.05 to 25,900 square kilometers), were derived by multiple regression analyses. A rainfall-runoff model was used in the synthesis of long-term annual peak data for each of 54 small watersheds (drainage areas less than 10.2 sq mi, 26.4 sq km). Synthetic frequency curves generated from five long-term precipitation stations were combined into one synthetic curve and then this synthetic curve was combined with the observed station frequency curve to define the station frequency curve. Synthetic data from the 54 small streams, observed data at 33 small streams, and observed data at 154 large streams were used in the analyses. The most significant independent variables in the regression analysis for estimating flood peaks on Illinois streams were drainage area, slope, rainfall intensity, and an areal factor.

Prepared in cooperation with Illinois State Div. of Highways, Springfield.

Curtis, GW

Geological Survey, Illinois State Division of Highways Final Rpt.  
USGS/WRI-77-104, July 1977, 40 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-277350/5ST

#### 00 176013

##### RAPID TRANSIT SUBWAYS-GUIDELINES FOR ENGINEERING NEW INSTALLATIONS FOR REDUCED MAINTENANCE

Economic design of new subways requires optimization of installation and maintenance costs of all the major constituent items. A prerequisite for this is an awareness of the rigorous environmental and other conditions imposed on the subway. Changing ground pressures crack structures, and this results in water seepages that deteriorate both the structure and the installed items. Durable watertight structures are obtained by using appropriate structural systems, material specifications, construction details, and waterproofing systems. Cathodic protection provides an economic protection against corrosion of metallic items in aggressive soil conditions. Ventilation and pump structures should be planned for ease of access and maintenance. Vents flush with street or sidewalk increase the dirt load and maintenance; above-surface alternatives should be evaluated. Escalators are high total cost items and operate under especially arduous conditions. Maintenance costs are reduced by using heavy duty components, adequate monitoring systems, and by designing the housing and machine room to permit ready maintenance and inspection. Automatic lubrication or sealed bearings also reduce maintenance. Elevators, ventilation equipment, and pumps and their housings should be engineered and specified to maximize durability of component and minimize maintenance on a similar basis to escalators. Passenger elevators should be planned to also move maintenance equipment and materials. Satisfactory architectural finishes should be selected for durability and ease of cleaning as well as for appearance. Stations should be planned for adequate monitoring of all spaces and for good illumination to reduce vandalism and to enhance public safety. Effective maintenance depends on ready accesses and provisions for movement of equipment and materials in the various sections of the subway. Station entrances, the portals, and ventilation and pump shafts should be designed accordingly. Guidelines and justification of good design practice for these and related subjects are presented.

Birkmyer, J

Bechtel, Incorporated, Urban Mass Transportation Administration,  
Transportation Systems Center UMTA-MA-06-0025-78-2, Jan. 1978, 119 pp

Contract DOT-TSC-1078

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279453/5ST

00 176452

**SUBCRITICAL CRACK GROWTH AND FRACTURE OF BRIDGE STEELS**

The research described provides information on fatigue crack growth behavior and corrosion fatigue, crack propagation behavior of various bridge steels under constant amplitude stress spectra and variable amplitude, and random sequence stress spectra. Also included in this discussion are details concerning the chemical composition, tensile properties, fracture toughness, and stress-corrosion-cracking behavior of the steels investigated. The data obtained for these steels showed that the average rate of fatigue crack growth, under variable amplitude, random sequence load fluctuation and under constant amplitude load fluctuation agreed closely when fatigue crack growth is plotted as a function of the root mean square of the stress intensity factor. Corrosion fatigue, crack propagation rates were found to be retarded by alternate wet and dry environmental conditions. The corrosion fatigue, crack propagation life of bridge-steel components under actual operating conditions in the aqueous environment investigated was equal to or greater than their fatigue life in a room-temperature air environment. No major effects of the aqueous environments were observed in this investigation to be related to the rate of propagation of fatigue crack. It is noted that additional research is needed to determine how actual bridge environment affects the rate of fatigue crack propagation.

Barsom, JM (Super Ocean Carrier Conference Organization); Novak, SR (United States Steel Corporation) *NCHRP Report* No. 181, 1977, 82 pp, 47 Fig., 7 Tab., 62 Ref., 7 App.

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DOTL RP

00 176901

**REPAIR OF THE WEINSBERG TUNNEL**

Three different and graduated reconstructive measures have been taken to eliminate damages to the tunnel of Weinsberg the cause of which were the generally well-known detrimental effects of water, weather and steam and diesel exhaust fumes as well as a heavy rock pressure. A detailed description is given to the cause of damage, of the planning and constructive measures taken as well as of the execution of work. [German]

Gremminger, G Spang, J *Eisenbahningenieur* Vol. 29 No. 1, Jan. 1978, 6 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 176907

**SOIL ENGINEERING IN LAND TRANSPORT [La ingenieria de suelos en las vias terrestres]**

This book discusses some of the most salient points of the application of soil mechanics in the field of highway, rail and airport design. Chapter VIII deals with the foundations of bridges and overpasses. Chapters IX and X tackle the subject of flexible and rigid pavements. The first part of Chapter XI is dedicated to surface drainage works and the second to the methodology that has been gradually adopted in Mexico for carrying out highway and railway-oriented geotechnical studies. Chapter XII deals with highway operation. Chapter XIII, field instrumentation, describes the present techniques permitting the evaluation of the performance of existing structures, verification of design assumptions and detection of incipient failure thus allowing the timely use of corrective measures. Chapter XIV discusses the excavation of tunnels through different soils, pressures and behaviour of various surfacings, as well as the settlement of the terrain. Chapter XV covers various subjects, scour, vibro-flotation, anchoring and collapsible soils. Chapter XVI deals with soil consolidation techniques, physico-chemical methods in particular. Chapter XVII reviews the methods for controlling the quality of overland transport ways. [Spanish]

Rico, A Delo, AA

LIMUSA Monograph Vol. 2 1977, 643 pp, 440 Fig., 114 Tab., 144 Phot., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-231651), Ministry of Public Works, Spain

ORDER FROM: LIMUSA, Arcos de Belen 75, Mexico DF, Mexico

00 176918

**RAILWAY CONSTRUCTION AND OPERATION REQUIREMENTS. STRUCTURAL AND ELECTRICAL CLEARANCES. 3RD EDITION**

The requirements specify the structural clearances that should be provided on new electrified railway lines and on existing lines where new structures are built. They are also to be provided where existing structures are modified or where clearances are otherwise altered. The requirements also deal with clearances between trains, intervals between lines, electrical clearances on electrified railway, and, lineside refuges.

Her Majesty's Stationery Office Monograph No. 3, 1977, 14 pp, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-400233)

ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

P7802142

00 176921

**LIGHTING FOR THE GREAT NORTHERN SUBURBAN RAILWAY ELECTRIFICATION**

The various aspects of the lighting programme of the Great Northern Railway electrification scheme are discussed and the lighting solution used and the results achieved are described. The lighting is described for the Hornsey E.M.U. Depot which comprises the following parts: the maintenance complex, the offices, and the overhead line depot. A description is included of the way in which the stations on the northern city line have been illuminated to provide a separate image and to keep costs down. Other aspects covered are tunnel lighting, lighting of Kings Cross station and the station throat, the Kings Cross freight terminal GN suburban station improvements and platform indicators. A brief mention is also made of the interior design of the new rolling stock to be used on the system.

Nelson-Smith, G (British Rail) *Light and Lighting* Analytic Vol. 71 No. 1, Jan. 1978, pp 18-23, 13 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-231798)

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00 177036

**FROST HEAVING OF TRACK--CAUSES AND CURES**

This paper reviews the causes and occurrences of track heaving and gives recommendations on means of economically reducing it. Suitable treatments and maintenance procedures can have significant effects on the amount of shimming required. With increasing use of concrete ties which can only be shimmed a limited amount, the question of how to reduce heaving is timely. Methods described include the reducing of the penetration of the frost line; reducing the availability of water to the frost line; and reducing the frost susceptibility of soils with various chemicals.

Peckover, FL *AREA Bulletin* Proceeding Vol. 79 No. 666, Jan. 1978, pp 145-173, 12 Fig., 5 Tab., 12 Ref.; 1 App.

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00 177108

**RETROFITTING PROCEDURES FOR FATIGUE-DAMAGED FULL-SCALE WELDED BRIDGE BEAMS**

Bridge beams on the east and westbound bridges of span No. 1 at Yellow Mill Pond in Bridgeport, Connecticut, were inspected for fatigue cracking and then retrofitted, using either the peening or the gas tungsten arc remelting procedures. The retrofitted beams were then subjected to fatigue strength tests. The results indicated that both procedures could be used to successfully extend the fatigue life and prevent further crack growth. Only details with initial crack depths greater than 1/8 inch did not achieve the desired life increments. For details with very small or no visible crack, the peening procedure appears to provide a reliable and the most economical means of retrofitting fatigue damage; for details with slightly larger cracks (up to 3/16 inch deep) the gas tungsten arc remelt process is preferred.

Fisher, JW (Lehigh University) *NCHRP Research Results Digest* No. 101, Apr. 1978, 7 pp, 5 Fig., 2 Tab., 5 Ref.

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00 177166

**MECHANIZATION OF CONSTRUCTION OF THE  
BAIKAL-AMUR RAILROAD [Mekhanizatsiya stroitel'stva  
Baikalo-Amurskoi magistrali]**

The construction of the Baikal-Amur main line involves building a line from Ust-Kut to Komsomolsk-on-the-Amur 3145 km long, the line Bam-Tynda-Berkakit 397 km long, and the second track on the Tayshet-Lena line 680 km long. About 200 stations, 142 large bridges (over 100 m long), and 27.1 km of tunnels are to be built. The article describes the machinery which is to be used in this undertaking and gives several photographs of the equipment to be used. [Russian]

Sosnov, ID (Ministry of Transport, USSR) *Mekhanizatsiya i Avtomatizatsiya Proizvodstva* No. 8, 1976, pp 1-5

ACKNOWLEDGMENT: EI  
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00 177194

**DEFORMATION OF LIME MODIFIED CLAY AFTER  
FREEZE-THAW**

The addition of small quantities of lime to a subgrade soil greatly improves its resistance to deformation which has been found to be extremely useful during construction under wet conditions. Soil suction, dynamic strength, and resilient characteristics of a glacial till commonly used for highway subgrade construction were studied experimentally. Changes in material properties resulting from variations in water content, lime content, confining pressure, and deviator stress intensity before and after subjecting the material to freezing and thawing were the variables considered. The results of the study indicated that the resilient characteristics of the till were so greatly improved due to the addition of lime that under certain conditions, a lime stabilized layer within a pavement structure would likely fail in tension and that the material could eventually behave essentially as a granular material.

Sauer, EK (Saskatchewan University, Canada); Weimer, NF *ASCE Journal of Transportation Engineering* Vol. 104 No. 2, Mar. 1978, pp 201-212

ACKNOWLEDGMENT: EI  
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DOTL JC

00 177196

**GEOMECHANICAL MODEL FOR ROCK FOUNDATION  
SETTLEMENT**

A geomechanical model is proposed for estimating the settlement of foundations on rock masses. Included is a rock mass model for reducing rock material properties to rock mass properties and an RQD model to correlate RQD with discontinuity frequency. The models are used with anisotropic elastic solutions to evaluate settlements on isotropic, transversely isotropic, and orthogonally jointed rock masses. An extensive material property summary is included for initial estimations, and design examples are included.

Kulhawy, FH (Cornell University) *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. 2, Feb. 1978, pp 211-227, 15 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

00 177198

**DESIGN OF A VENTILATION SYSTEM FOR AN ENGLISH  
CHANNEL TUNNEL**

The theoretical and design work of the tunnel ventilation system is described. The subjects discussed cover ventilation and piston effect; instantaneous velocity distribution in tunnels and draft relief cross passages; pressure profile in main tunnel near to a train; pressure pulses on train and instantaneous aerodynamic power; idealized pressure distribution in tunnel systems; and pressure at fan under operating conditions.

Henson, DA Lowndes, JF *ASHRAE Journal* Vol. 20 No. 2, Feb. 1977, pp 23-28, 1 Ref.

ACKNOWLEDGMENT: EI  
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00 177200

**NEW AIR SHAFT DESIGN FOR RAILROAD TUNNELS**

An outline of the various methods for reducing pressure fluctuations is given. These range from simple non-aerodynamic methods to complex proposals involving the optimum positioning of airshafts. The latter case leads to a new airshaft design which overcomes some of the problems caused by long airshafts of conventional design. The description has been concentrated on the case of long shafts, that is shafts which exceed about 5% of the tunnel length.

Vardy, AE (Leeds University, England); Fox, JA *ASHRAE Journal* Vol. 20 No. 2, Feb. 1978, pp 41-46, 12 Ref.

ACKNOWLEDGMENT: EI  
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00 177201

**MEASURING THE STRUCTURAL PERFORMANCE OF CAST  
IRON TUNNEL LININGS IN THE LABORATORY**

The structural behavior of bolted cast iron segments has been investigated under simple, known loading conditions. This knowledge was required to help ascertain the structural behavior of segments in actual tunnels where complex loading conditions exist. One of two kinds of segment studied was an experimental segment of unusual proportions. Some structural properties of tunnel segments for which evidence had previously been inconclusive were clearly displayed by these experimental segments. Among the conclusions drawn are that the modulus of flexural rigidity of the segments is changed by variation in the applied bending movement, and also with variation in uniform pressure on the back of the segment. The joints between segments do not always behave as simple butt joints.

Thomas, HS (Building Research Establishment) *Ground Engineering* Vol. 10 No. 5, July 1977, pp 29-36

ACKNOWLEDGMENT: EI  
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00 178147

**MODEL TESTS FOR PLASTIC RESPONSE OF LINED TUNNELS**

Static isotropic and uniaxial strain loading tests were performed on models in a rock simulant having an unconfined compressive strength of about 4,300 psi (29.7 mn/m squared) and a friction angle of 33 degree. The liners consisted of direct-contact steel tubes of three different radius-to-thickness ratios ( $a/h$ '50, 25, 12.5). In the isotropic loading experiments, the load-deformation relationship for the liners was in good agreement with theoretical curves from an elastic-plastic analysis and showed substantial increase in strength with increasing liner thickness. At the higher loads, the  $a/h$ '50 and  $a/h$ '25 liners buckled, and the deformations became larger than predicted by the theory. The  $a/h$ '12.5 liner did not buckle, even at tunnel closures of 5%. Similar behavior was found in uniaxial strain loading experiments, but 30% to 50% less load was required to cause 5% tunnel closure than under isotropic loading.

Kennedy, TC (Oregon State University); Lindberg, HE *ASCE Journal of the Engineering Mechanics Division* Vol. 104 No. 2, Apr. 1978, pp 399-420

ACKNOWLEDGMENT: EI  
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DOTL JC

00 178271

**FROST GROUND PENETRATION TESTS IN SITU**

The author describes the in-situ observations made by him over a period covering several winters, one of which is qualified as very severe. He explains the research methods, the types of measuring instrument used, the nature of the soil and the water content of the observation stations. Considerable emphasis is placed on the analysis of the frost index, which the author considers as a decisive factor in assessing frost depth.

Grodecki, W *Rail International* No. 4, Apr. 1978, pp 272-278, 3 Fig., 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

00 178282

**CONSOLIDATION AND RESTORATION OF OLD RETAINING WALLS AND EMBANKMENT LINING [Sanierung und Erneuerung alter Stuetzmauern und Boeschungspflasterungen]**

No Abstract. [German]

Fein, E *Elsners Taschenbuch der Eisenbahntechnik* DB: Dok 4693, 1978, pp 113-137, 29 Phot., 8 Ref.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 178285

**PRELIMINARY STUDIES ARE DESIGNED TO SYSTEMATIZE THE ORGANISATION OF EARTHWORKS PROJECTS AND OF TUNNEL AND BRIDGE BUILDING [Die Systematik der Vorhabenabwicklung von Erd- und Kunstbauten als Aufgabe der Vorplanung]**

Prior to the building of new lines on the DB, studies are carried out as part of the overall land planning policy and of the technical implementation and monitoring process. In order to ensure that a particular infrastructure is developed and maintained on an economic basis, recourse is had to an integrated project planning, assessment and organization system making maximum use of computerized data processing. The article describes the system involved, which has a built-in "method of expenditure evaluation and project organization" among other things. [German]

Halberstadt, L *Die Bundesbahn* Vol. 53 No. 12, 1977, pp 899-906, 5 Phot.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

00 178427

**PROGRAMMING OF TRACK SUPERSTRUCTURE AND FOUNDATION WORK ON THE DR [Zur technologischen Planung von Oberbau- und Unterbauarbeiten bei der Deutschen Reichsbahn]**

The technique used by the DR to improve track-foundation stability is based primarily on the laying of gravel or rocks and protection layers. The operation is conducted in three stages: preparation, infrastructure, track-laying, and each of these phases consists of several work stages. [German]

Darr, E *Signal und Schiene* Vol. 21 No. 12, 1977, pp 406-407, 3 Fig., 2 Ref.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

00 178436

**THE PROBABLE DYNAMIC LOAD OF RAILWAY BRIDGES [Die wahrscheinliche Verkehrslast von Eisenbahnbruecken]**

The author defines track loads as a means of determining the maximum constraints and assessing the risks of bridge wear. [German]

Herzog, M *Bauingenieur* Vol. 53 No. 1, 1978, pp 29-32, 3 Tab., 5 Phot., 6 Ref.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Springer Verlag, 175 Fifth Avenue, New York, New York, 10010

00 178482

**DESIGN AND CONSTRUCTION OF SOME UNDERGROUND STATIONS FOR THE HONG KONG MASS TRANSIT RAILWAY SYSTEM**

The paper describes the sites, the soil conditions and the structural concepts chosen to overcome the difficulties foreseen. The method used to construct the main walls, which is the principal structural feature, is described and illustrated. The method adopted is based on local construction techniques but designed by means of modern structural analysis. The preparation of the tenders is described and some of the construction problems are covered.

Banjamin, AL (Maunsell (G) and Partners); Endicott, J Blake, RJ *Structural Engineer* Vol. 56A No. 1, Jan. 1978, pp 11-20, 1 Ref.ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 178484

**PROBLEMS ASSOCIATED WITH RAILROAD FILLS AND SUPPORTS**

An on-going investigation on rail support material is briefly reported. Triaxial static and repeated loading compression and extension tests on a dolomite ballast are reported and the significance to track design discussed. Model tests using a large scale rail track, ballast, sub-ballast and sand subgrade are reported. The significance to tie and track design of the results is briefly discussed. Further work is required but the results clearly indicate that fruitful conclusions should be forthcoming which would lead to reduced maintenance costs.

Proceedings of the 5th Southeast Asian Conference on Soil Engineering, Bangkok, Thailand, July 2-4, 1977. Also available from Engineering Societies Library.

Raymond, GP (Queen's University, Canada)  
Asian Institute of Technology Proceeding 1977, pp 275-286

ACKNOWLEDGMENT: EI

ORDER FROM: Asian Institute of Technology, P.O.B. 2754, Bangkok, Thailand

00 178497

**ACOUSTIC EMISSION MONITORING OF SOIL STABILITY**

Seventeen sites monitored for acoustic emission are described, including twelve earth dams, two surcharge fills, two embankments and one man-made reservoir where seepage was detected. The results from all sites lead to the following generalizations. Soil masses can deform and consequently will produce acoustic emissions which exceed background noise levels. Soil masses which generate no acoustic emissions are probably not deforming, and are in a state of equilibrium. Soil masses generating moderate levels of acoustic emissions (10 counts/min to 100 counts/min) are marginally stable and require continued monitoring. Soil masses generating high levels of acoustic emissions (100 counts/min to 500 counts/min) are actively deforming and unstable, requiring immediate remedial action. Soil masses generating very high levels of acoustic emissions (greater than 500 counts/min) are in, or are very near a failure state.

Koerner, RM (Drexel University); Lord, AE, Jr McCabe, WM *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. 5, May 1978, pp 571-582, 24 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

00 178537

**BRIDGE AND TUNNEL MAINTENANCE METHODS**

Bridges and tunnels are valuable assets. They were usually built long ago and their ageing inevitably involves a whole range of maintenance and renewal operations. These are costly and cause inconvenient and expensive interference to traffic. The maintenance of structures of this type requires engineering work on foundations in rivers, metal bridges, stone and brick bridges, and retaining walls. A decentralised organisation, very sound methods and extensive planning are required. This involves heavy expenditure but it is absolutely necessary because running safety and traffic regularity depend on such work. [French]

Chambron, E Thomas, J *Revue Generale des Chemins de Fer* Vol. 97 Jan. 1978, pp 52-67

ACKNOWLEDGMENT: British Railways

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DOTL JC

00 178539

**MAINTENANCE OF EARTHWORKS**

Earthworks usually date from the construction of SNCF lines in the 19th Century. They were carefully constructed by labourers but the quality of the materials used was often poor and maintenance was inadequate or indifferent. Keeping these earthworks which can be either cuttings or embankments, in good condition therefore involves many problems connected with stability; the difficulties encountered may be superficial or deep-rooted and affect soil as well as rock. Cuttings through loose ground, cuttings through rock, embankments, cavities and subsidence therefore have to be watched most carefully. Earthworks judged to be weak then have to be consolidated. Examples are given of cases that have arisen recently on SNCF lines and the solutions adopted to cure them. [French]

Verrier, G *Revue Generale des Chemins de Fer* Vol. 97 Jan. 1978, pp 37-51

ACKNOWLEDGMENT: British Railways

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00 178543

#### BUILDING THE JOETSU SHINKANSEN

The 275-km high-speed line being constructed from Tokyo to Niigata requires the crossing of the main mountain range of Japan's main island. Penetrating the central mountains involves a series of tunnels, including the world's longest at 22.2 km. On the alluvial Niigata plain rigid-frame viaducts with continuous underground beams resting on friction piles assure even settlement of the structure. Warm-water sprays will prevent open sections of the viaduct from being blocked by snow.

Shinohara, T (Japan Railway Construction Corporation) *Railway Gazette International* Vol. 134 No. 5, May 1978, pp 286-290, 5 Fig., 5 Phot.

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00 178917

#### CONSTRUCTION OF RAILWAY OVERPASSES WHILE SERVICES CONTINUE TO OPERATE [Bauverfahren fuer Eisenbahneuerfuehrungen unter in Betrieb befindlichen Gleisanlagen]

The construction of railway overpasses while rail services continue to be operated on the route largely without interference calls for thorough planning of the individual stages of the work. Since there is no procedure which is equally suitable and economical for every possible circumstance, the merits and demerits of the various methods of working must be carefully weighed. These are described by the author, and include the following: bypassing of the actual construction site, temporary single-track working, or either-direction working building with the aid of temporary structures, sliding the bridge superstructure into position, pushing into place with substitute sleeper carriers, and moving whole structures into position by means of hydraulic presses. All these methods have their particular field of application, and each is constantly being improved and extended. [German]

Hettwer, H *Eisenbahningenieur* May 1978, pp 279-283, 4 Fig., 7 Ref.

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 178918

#### MOVING A NEW RAILWAY BRIDGE INTO POSITION WITH THE HYDRAULIC PRESS METHOD [Neubau einer Eisenbahneuerfuehrung im Durchpressverfahren bei gleichzeitigem Abbruch eines bestehenden Brueckenbauwerkes]

The article describes the renewal of a railway bridge over a roadway under very difficult conditions. The curved bridge carries the electrified double-track main railway line between Augsburg and Ulm. Immediately adjacent to the bridge are two sets of switches which caused the bridge-builders considerable difficulty. The new, widened road passes under the railway line at an angle. A procedure had to be found which would meet the DB's need for minimal interference with train services on this heavily worked route. The problem was solved by resorting to hydraulic presses for moving the new bridge into position. While the new structure was being advanced, the old bridge was simultaneously demolished. The method here described is a safe, economical answer to the increasingly frequent need for widening and renewing existing railway overpass structures on heavily-worked routes. [German]

Klingenberg, H Lippert, T *Eisenbahningenieur* May 1978, 5 pp, 7 Fig.

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 178952

#### GIRDER-ERECTION EQUIPMENT--OVERHEAD CRANE TYPE

On the Shinkansen line the proportion of viaducts has been increasing and 49% of the track of the Tohoku and the Joetsu Shinkansen now under construction is taken up by viaducts. Up to the present time, the viaducts built were rigid frame concrete structures. Recently girder erection equipment of the overhead crane type has been perfected and is described in this article.

Niwa, T (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 4, 1978, pp 18-19, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

00 179063

#### BOATS, PILES AND PIERS

It is reported that floating permanent formwork for the river piers of Brisbane's new rail bridge also serves as pile guides.

*Consulting Engineer* Vol. 42 No. 1, Jan. 1978, pp 26-27

ACKNOWLEDGMENT: EI

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DOTL JC

00 179119

#### EVALUATION OF RAILROAD LIME SLURRY STABILIZATION

This report describes a multifaceted investigation into the application of lime slurry pressure injection (LSPI) to stabilize and improve railroad roadbeds. Areas discussed include (1) the current state of lime-injection technology, (2) soil exploration and testing related to the use of LSPI, (3) costs of roadbed stabilization by the LSPI method, (4) Environmental aspects of the track-roadbed structure. In addition, summaries to two types of ancillary reports are included: (1) those resulting from case studies of several specific lime-injection projects and (2) those describing independent research work involving either the lime-soil combination or finite element analysis of the track-roadbed structure.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Prepared in cooperation with the Federal Railroad Administration and the Transportation Systems Center with the aid of the Railroad industry.

Blacklock, JR

Graduate Institute of Technology Final Rpt. FRA/ORD-78/09, June 1978, 178 pp, Figs., Tabs., Refs.

Contract DOT-OS-40107

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-282998/AS, DOTL NTIS, DOTL RP

00 179120

#### SUMMARY REPORT-BALLAST AND FOUNDATION MATERIALS RESEARCH PROGRAM

This report constitutes a summary of the results of the various phases of the Ballast and Foundation Materials Research Program. Data and information obtained from the technical literature and that developed in the project are summarized. Implications of the research data and findings are discussed and recommendations for further studies are presented. Topics considered in the program were a) resilient and permanent deformation behavior of ballast and subgrade materials, b) track support system temperature regime, c) lateral stability of ballast, d) structural behaviour of the track support system (including the development of the Illi-TRACK structural model), and 3) an economic study of ballast and ballasting practices.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Thompson, MR Hay, WW Tayabji, SD

Illinois University, Urbana Final Rpt. FRA/ORD-78/10, June 1978, 84 pp, Figs., Tabs., 22 Ref.

Contract DOT-FR-30038

ACKNOWLEDGMENT: FRA

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PB-282348/AS, DOTL NTIS, DOTL RP

00 179264

#### RECENT TENDENCIES OF DETERIORATION IN TUNNEL

The author notes that deterioration in tunnels is mostly due to the unexpected occurrence of bad geological conditions, but points out also that it can be due to lack of care in tunnel design and construction. After examining a number of tunnels where deformation has occurred during operation, the author discusses how such deformation develops, and lists four causes: deformation of tunnel lining, tunnel movement, enlargement of

the space behind the lining due to the outflow of sandy materials, and flaking off of the lining.

Shirai, K. *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Dec. 1977, pp 150-153, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

00 179265

**TEST OF ICICLE PREVENTION IN VERY COLD ZONE**

A major problem encountered in tunnels in cold areas is the formation of icicles or ice on tunnel sides; in extra cold areas, freezing is the main problem. These problems are particularly acute in snow zones, where train operation is only made possible by procedures to dislodge the icicles and scrape the side walls. Active prevention methods are being investigated, involving field tests in Kamihaboro Tunnel.

Goto, I. *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Sept. 1977, 135 pp

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

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00 179524

**TUNNELLING TECHNOLOGY. AN APPRAISAL OF THE STATE OF THE ART FOR APPLICATION TO TRANSIT SYSTEMS**

This appraisal forms part of a continuing study of the applicability of tunnelling technology to urban transit systems in tunnels of intermediate diameter. It deals specifically with present and potential tunnelling methods suited to the subsurface conditions of three Ontario locations: Toronto, Hamilton and Ottawa. Experience gained in these areas in the construction of deep sewers and of transit tunnels is related to present world-wide technology. The conclusions from this study are that the cost and feasibility of a transit tunnel are more dependent on the variations in subsurface conditions along the tunnel route, on contractual arrangements and on the length of tunnel necessary to amortize the cost of specialized equipment, rather than on the exact diameter of the tunnel within the range under consideration. The study indicates that the technology and expertise necessary for construction of transit tunnels is readily available in Ontario. It is further concluded that tunnelling merits serious consideration for transit routes where land acquisition costs are high or where the disruption of services is a major problem. In favorable subsurface conditions, the benefits arising from reduced environmental intrusion into a community may more than offset the somewhat greater costs of tunnel transit systems over surface or elevated systems.

Ontario Ministry of Transportation & Communic, Can, Golder Associates, MacLaren (James F) Limited May 1976, 166 pp, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 232254)  
ORDER FROM: Ontario Ministry of Transportation & Communic, Can, 1201 Wilson Avenue, Downsview, Ontario M3M 1J8, Canada

P7803084

00 179623

**AVALANCHE PROTECTION BY MEANS OF WIRE ROPE SNOW FENCES [Die Lawinstuetzverbauung mit Drahtseilschneezaeunen]**

The possibilities of protection against avalanches comprise methods of stabilizing the snow masses to prevent the start of an avalanche, snow retaining walls and structures to catch and divert the avalanches. Protection by means of resilient wire rope fences serves to prevent an avalanche starting by stabilizing and supporting the layers of snow. The main elements of such a wire rope fence are steel uprights, a network of supporting and tensioning ropes, steel anchorages and wire mesh. The costs of plant, materials, labour and transport are described as low. This article deals in the main with the forces which occur, and which are significant for the design of the various structural members and their foundations. This method of avalanche protection has been used with success on a number of occasions in Austria. [German]

Brugger, F. Leys, E. *Oesterreichische Ingenieur-Zeitschrift* Vol. 20 No. 4, Apr. 1977, pp 118-124, 4 Fig., 6 Tab., 2 Phot., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 306591)

ORDER FROM: Springer Verlag, 175 Fifth Avenue, New York, New York, 10010

00 179624

**FROST PROTECTION OF NORWEGIAN ROAD TUNNELS [Litt om frostsikring av norske vegtunneler]**

In Norway there are about 10-15 km of road tunnels built annually, a large proportion of the tunnels are situated in areas with severe frost. Problems invariably arise in this context in that part of the tunnel's frost zone where the leakages do not freeze dry. Accumulation of ice along walls and in ditches often clogs up the drainage paths, causing water to spill on to the road where it freezes, making driving hazardous and creating difficulties for the maintenance crews. The three main methods of permanent frost protection are: injection, insulated aluminium sheets, concrete lining waterproofed with membrane. Injection is only used where the leakages are fairly small and are considered easy to stop. A satisfactory frost protection can then be attained at low costs. The method most used, however, is the use of insulated aluminium sheets for the whole length of the frost zone after safeguarding the rock-face with bolts, possibly combined with metal bands and/or wire mesh. The cost of this solution is in the region of nkr 4000-5000 per linear metre. Where the rock is of a poor quality and accompanied by major leakages, a concrete lining, waterproofed with membrane, is the only acceptable solution being, however, rather expensive at a stipulated nkr 20000-25000 per metre.(a) [Norwegian]

Pedersen, KB (Veglaboratoriet) *Frost i Jord* No. 19, Dec. 1977, pp 27-33, 4 Fig., 4 Phot., 9 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 232470), Norwegian State Highway Laboratory

ORDER FROM: Royal Norwegian Council for Scientific & Indus Res, Gaustadalleen 25, Oslo 3, Norway

00 179979

**DESIGN CRITERIA FOR RAILWAY TUNNEL VENTILATION SYSTEMS**

Cascade and flathead tunnel ventilation system operating sequences are discussed and comments are made on design equations.

Technical Paper and Symposium Paper presented at the Annual Meeting of ASHRAE, Halifax, Nova Scotia, June 26-30, 1977.

Nelson, CG (Burlington Northern, Incorporated) *ASHRAE Journal* Tech Paper Vol. 83 Part 2, 1977, pp 375-391, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Soc of Heat, Refrig & Air Condition Engrs, 345 East 47th Street, New York, New York, 10017

00 179980

**FRACTURES--PROBLEM FOR WELDED STEEL BRIDGES**

While research is showing how fatigue cracking problem can be avoided by careful design and quality control, repairs to existing structures are difficult. Repairs are hindered because the original design and materials must be used and because some types of repairs can actually aggravate the problem. To protect existing structures, bridges can be thoroughly inspected frequently so repairs can be made before the structure fails, or it can be assumed that a crack exists and repairs made to counteract the crack. The article is based on the contributions of four experts and an investigative consultant.

*ASCE Civil Engineering* Vol. 48 No. 4, Apr. 1978, pp 70-73

ACKNOWLEDGMENT: EI

ORDER FROM: Engineering Society Library, 345 East 47th Street, New York, New York, 10017

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01 053259

**UNCONVENTIONAL TRACKS. RESUME REPORT ON UNCONVENTIONAL TRACKS**

The various types of unconventional tracks studied by the Committee are classified and considered relative to possible applications. Design methods, importance of natural or improved soil conditions and requirements for adjustability are reviewed. After presenting advantages and disadvantages and current trends in costs, non-conventional construction is recommended in tunnels or on rock formation, with possible future application in other cases.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D87/RP 17, Apr. 1977, 34 pp, 5 Phot.

ACKNOWLEDGMENT: UIC

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01 053268

**BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURES, ENQUIRY INTO THE LAYING OF CONTINUOUS WELDED RAILS ON STRUCTURES**

This report reviews the regulations in force on 14 railway systems for the laying of jointless track, both on ballasted bridges and on bridges on which direct fixings are used.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways D 101/RP 10, Oct. 1977, 21 pp, 17 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

01 053269

**MUTUAL RAIL/WHEEL WEAR AND CORRUGATORY WEAR. FORMATION OF CORRUGATION AND WAVES ON THE RAIL AND MUTUAL WEAR OF WHEEL AND RAIL**

This report is essentially an analysis of the replies to a questionnaire sent to the Member-administrations of ORE concerning mutual rail/wheel wear and corrugatory rail wear problems. The Administrations are interested in these problems but their replies do not introduce many new elements of information with respect to existing knowledge. Taking into account the complexity of the phenomena concerned, the more or less successful studies already made and the fact that the adopted empirical solutions reduce the economic importance of the phenomena, it is considered that the carrying out of new systematic studies would be pointless. A permanent exchange of information is nevertheless recommended.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways S 1012/RP 1, Apr. 1977, 64 pp, 3 App.

ACKNOWLEDGMENT: UIC

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01 170936

**LAYING TRACK WITHOUT JOINTS ON CURVES WITH A SMALL RADIUS [Tor bezстыkowy w lukach o malym promieniu]**

This article deals with the possibility of using long welded rail for track-laying on curves with a radius of less than 600 m. [Polish]

Brzozowski, A Koc, W *Przegląd Kolejowy Drogowy* Vol. 24 No. 6, June 1977, pp 172-175, 3 Fig., 2 Tab., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Wydawnictwa Komunikacji i Łączności, Kazimierzowska Ulica 52, Warsaw 12, Poland

01 170940

**TRACK WITHOUT BALLAST LAID ON ASPHALT [Schotterloser Oberbau in Asphaltbauweise]**

The article describes the permanent way with an asphalt underlayer in detail and gives the results of the tests carried out by the DB since 1974. [German]

Herrmann, P *Eisenbahningenieur* Vol. 28 No. 10, 1977, pp 440-444, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

01 170942

**SOME ASPECTS OF THE SERVICE LIFE OF THE PERMANENT WAY [Niektóre aspekty trwałości eksploatacyjnej podtorza]**

The service life of railway track depends upon that of the various components making up that track. The author reviews what factors affecting the service life of track and ways of extending it. He considers the expense involved in strengthening permanent way. [Polish]

Skrzynski, E *Przegląd Kolejowy Drogowy* Vol. 24 No. 9, Sept. 1977, pp 258-262, 5 Fig., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Wydawnictwa Komunikacji i Łączności, Kazimierzowska Ulica 52, Warsaw 12, Poland

01 172004

**DISTURBANCE OF TRACK-BED AT JUNCTIONS WITH BRIDGES [Stoerung der Gleislage beim Uebergang zu Kunstbauwerken]**

Study of the causes of deterioration at gaps on the track between the ballast and the bridge. Possible solutions for construction and maintenance to ensure satisfactory continuity; case of bridges with long spans and ballastless track. [German]

Eisenmann, J Leykauf, G *Eisenbahntechnische Rundschau* Vol. 26 No. 10, Oct. 1977, pp 673-683, 2 Fig., 7 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

01 172006

**MODERNISATION OF METHODS FOR REPAIRING REINFORCED CONCRETE SLEEPERS [Vasbetonalj javitasi modszerek korszerusítése]**

No Abstract. [Hungarian]

Horvath, F *Vasut* No. 7, 1977, pp 6-8

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Vasuti Tudományos Kutató Intézet, Múzeum 11, Budapest 8, Hungary

01 172018

**AMTRAK GOES FOR BETTER TRACK**

The absence of a national policy regarding the relationships of Amtrak's intercity passenger service and the 26,000 miles of railroad-owned track over which it is operated led to a task force's recommendations for eight policy options now adopted by the Amtrak board. The goal will be higher average speeds on selected corridor routes to enhance the competitiveness of Amtrak services.

*Progressive Railroading* Vol. 21 No. 1, Jan. 1978, pp 59-60

ACKNOWLEDGMENT: Progressive Railroading

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

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01 172578

**THE FATIGUE STRENGTH OF RAILS WITH ELECTROLYTIC CORROSION DAMAGE [Ustalostnaya prochnost' rel'sov s elektrokorrrozionnymi povrezhdeniyami]**

The effects of corrosion by electrolysis on the base of the rail are dealt with. Studies have revealed that electrocorrosion damage to the rail base rim decreases its fatigue strength, and thus leads to a decreased rail life by lowering the limit of endurance of the rail. Volume tempered rails with the same depth of corrosion as nonheat-treated rails are less affected so far as service life. With an increase in corrosion-damage depth of the base to 5 mm, the limit of endurance decreases from 31 to 24 kg/sq mm. Typical examples of transverse fractures initiated by corrosion and finalized by cyclical bending are shown. [Russian]

Shur, YA Bychkova, NY Glonti, AN *Vestnik VNIIZT* No. 8, 1974, pp 26-29, 4 Fig., 2 Tab., 5 Ref.



ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172579

**MEASUREMENT OF LATERAL FORCES PRODUCED BY RAILS ON CONCRETE TIES** [Izmereniye bokovykh nagruzok ot rel'sov na zhelezobetonnye opory]

The apparatus and its use in the measurement of lateral forces transmitted from the rails to ferroconcrete supports are described. This apparatus and the results obtained from its application are used for studying the effect of vertical and lateral rigidity of the ties on the magnitudes of loads which are transferred from the wheel to the elements of the track. Drawings are provided of the apparatus used in determining the loads on the foundations under the rail and oscillograms are included which show recordings of the dynamic lateral loads. [Russian]

Kravchenko, ND Lysyuk, VS *Vestnik VNIIZT* No. 6, 1975, pp 48-50, 2 Fig., 4 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172580

**ANALYSIS OF THE LIFE OF FULLY HEAT TREATED RAIL AND STANDARD RAIL SUBJECTED TO SUCCESSIVE HARDENING** [Issledovaniye rabotosposobnosti ob'yemnozakalennykh i standartnykh rel'sov pri ikh mnogokratnoy perekladke]

This paper describes an investigation into how the mechanical properties of worn rails removed from a track system change in relation to the traffic density and the weight carried. The study also includes investigations aimed at restoring the desired characteristics of the rail heads by successive heat treatments. Impact tests were used to evaluate the effects of volume tempering of worn rails and attempts were made to establish the relationship between the operational mode and the rail head profile on impact and fatigue strengths. Suggestions are given for reducing the risk of rail damage due to various defects, including a recommendation for periodic grinding of the heads. [Russian]

Poroshin, VL *Vestnik VNIIZT* No. 4, 1975, pp 39-43, 4 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172581

**WEAR OF TRACK AS RELATED TO TRAFFIC LOAD** [Nakopleniye povrezhdeniy zheleznodorozhnogo puti pod podvizhnoy nagruzkoy]

Attempts are made to provide a reliable determination of the full wear of certain elements of the rail on the basis of the incurred average stresses. In the general case of nonsymmetrical, relatively average stresses, it is necessary to establish both the symmetrical and nonsymmetrical limits integration. Diagrams are presented for determining the equivalent stresses and for calculating the accumulation of damages. [Russian]

Margot'yev, AN *Vestnik VNIIZT* No. 7, 1975, pp 44-48, 2 Fig., 5 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172582

**HIGH SPEED TRACK INSPECTION MACHINE**

The speed improvement tests conducted on the new Sanyo Trunk Line have revealed the necessity for control over the short-wavelength track irregularities that possibly result from the shape of the rail-head section, as well as the long-wavelength track irregularities such as those detectable by the level transit. The author describes the structure of the high-speed track-inspection equipment (HISTIM), which has been developed for inspection and measurement of such track irregularities, and presents the results of the tests conducted with the equipment. The short-wavelength irregularities occur under the fluctuations of the wheel load and changes in lateral force, while the long-wavelength irregularities considered as the disorder of surface in relation to travelling comfort. [Japanese]

Sato, Y (Railway Technical Research Institute) *Permanent Way* Vol. 23 No. 3, 1975, pp 171-175, 9 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

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01 172583

**A STUDY ON THE EXPECTED LIFE OF RAILS IN THE SEIKAN TUNNEL**

Seikan tunnel, which connects the Mainland of Japan to Hokkaido, is approximately 54 km in total length, and the part of the tunnel located under the bottom of the sea is in a seawater corrosion environment. The rails to be used for the track in the tunnel should have strong resistance to wear and fatigue. The present report concerns itself with an estimate of 60-kg/m rails when applied to the Seikan tunnel. The 60-kg/m rail in its present shape cannot be regarded as being sufficient for the purpose, and it is necessary to improve on its sectional shape for application there. In doing so, the rail should be given a different sectional shape and greater weight. While galvanizing prolongs the rail life by about 5 years, it is necessary to remove zinc completely from the rails in case long rails are adopted, and this will create a problem at the time of field welding. [Japanese]

Kato, Y Kuroda, S Sugiyama, R Sakurudu, R *Journal of Railway Engineering Research* Vol. 32 No. 2, 1975, pp 63-64, 1 Fig., 2 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Railway Technical Research Institute, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

01 172584

**TRENDS IN SWITCH CONSTRUCTION** [Entwicklungen im Weichenbau]

The increase in the speed of passenger trains to more than 250 km/hr calls for the development of new types of switches using S-49 rails. A switch with spring-type frog point for a high-speed experimental track of the West German Federal Railroads is demonstrated. [German]

Topp, G *Rheinstahl-Technik* Vol. 12 No. 1, 1974, pp 47-48, 5 Fig., 1 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Rheinstahl (AG), Essen, West Germany

01 172585

**THE TRANSITION AND PRESENT STATUS OF RAILS FOR RAILWAYS**

The present work contains a survey of the transition of railway rails from 1901, when the first rail was produced in Japan, to the present and it also provides a description of the present-day status of rails for railways. At present, a total of more than 500,000 tons of rails per year are produced in Japan at the Yahata Iron Works of Nippon Steel Corporation and the Fukuyama Iron Works of Nippon Kokan Kabushiki Kaisha. These iron works produce such varieties of rails as 60-kg/m-50 m rails, hyper-hardened-head rails having improved resistance to wear and improved resistance to contact pressure, and rails with head flanges strengthened by heat treatment, representing a strengthening of the rail edge, which has a structural weakness. This study points out that it will be necessary for the future production of rails to employ such techniques as vacuum degassing and continuous casting of blooms as well as introducing alloy steels. [Japanese]

Kurihara, T (Railway Technical Research Institute) *Japan Society of Mechanical Engineers, Journal of* Vol. 78 No. 683, 1975, pp 941-947, 9 Fig., 2 Tab., 13 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Japan Society of Mechanical Engineers, Sanshin Hokusei Building, 2-4-9 Yoyogi, Shibuya-ku, Tokyo 151, Japan

01 172587

**LIMIT OF TRAFFIC LOAD CAPACITY FOR S 49 RAILS IN TRACKS AND SWITCHES** [Grenzbelastung der Schiene S 49 in Gleisen und Weichen]

Owing to the increase in axle load, travelling speed and traffic volume, S 49 rails have in many cases reached the limit of their load-carrying capacity. The usual practice of evaluating the vertical and lateral wear of the rail head alone

is no longer sufficient to determine the point in time at which the rails have to be replaced. The factors, ultimate traffic load capacity, type of track construction and behavior of rails not replaced in time, are discussed and explained by means of examples. [German]

Kraft, W (Bundesbahn-Zentralamt, West Germany) *Eisenbahningenieur* Vol. 25 No. 3, 1974, pp 78-81, 1 Fig., 2 Tab., 2 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

#### 01 172588

##### BEHAVIOR OF RAIL STEEL USED BY THE WEST GERMAN FEDERAL RAILROADS [Verhalten von Schienenstahl bei der Deutschen Bundesbahn]

In the past two decades the West German Federal Railroads have increasingly used heavy rails of wear-resistant steels with a minimum tensile strength of 90 kg/sq mm. Since 1970 use has been made exclusively of wear-resistant rails of grade A, which differs from grade B in carbon and manganese content. This decision was determined by the favorable transformation behavior of grade A during welding. Details are given to prove the successful use of these rails. In the future rails with a minimum tensile strength of 100 kg/sq mm will be needed.

Munch, W (Bundesbahn-Zentralamt, West Germany) *Eisenbahntechnische Rundschau* Vol. 22 No. 6, 1973, pp 214-218, 8 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

#### 01 172590

##### RESEARCHERS FIND CAUSES OF RAIL CORRUGATION

This article describes the experiences and study results of the Canadian Pacific Railroad into the problem of rail corrugation that has occurred in the heavy grade/heavy curve territory of Western Canada. As a result of their investigations, Canadian Pacific has proposed a five-point program as a long-range approach to elimination of the contributing factors of the defect. The program involves concentrating on the wheel-rail interface, adoption of self-steering trucks to reduce lateral forces, improvement in rail metallurgy, reexamination of the lubrication policy, and reduction in the magnitude of dynamical rail loading. The nature of corrugation is discussed in relation to its formation and the subsequent wear process. From the study results, it appears that lubricant accumulation plays a large role in the formation of rail surface fatigue. It is recommended that railroads whose traffic levels approach 40 million gross tons per year adopt the proposed five-point program.

*Progressive Railroading* Vol. 19 No. 1, Jan. 1976, pp 65-66, 1 Fig., 3 Phot.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

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#### 01 172591

##### UNDERGROUND RAIL TRANSPORT INSTALLATIONS AT MOUNT ISA MINES, LTD., QUEENSLAND

During the past eight years the underground rail system at the Isa mine has been upgraded, resulting in an increase in haulage capacity from 3 to 10 million tons annually. This sophisticated haulage system reduced the haulage cost per ton by 15 percent in fiscal year 1974-75. The approach to be taken for the proper selection of haulage rail is described. Installation of the 47 kg/m A.S. rails was based on observations of rail wear and life. Adjustments were made for adverse underground conditions such as ore spillage, heavy braking, acceleration, and inadequate maintenance. Data are given for expected rail life based on rail size and tonnage hauled. A brief description is given of the ultrasonic track-inspection equipment, its use, and the action taken when a defective rail is detected.

From Institution of Mining and Metallurgy Transactions, Section A., Mining Industry.

MacHunter, PM (Mount Isa Mines, Limited, Australia) *Institution of Mining and Metallurgy Transactions* Vol. 84 No. 827, Oct. 1975, p A139, 10 Fig., 2 Tab., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England

#### 01 172592

##### INVESTIGATIONS OF THE SERVICE BEHAVIOR OF RAILS

###### [Untersuchungen zum Gebrauchsverhalten von Schienen]

Service problems with German rail steels are reviewed. Replacement of 549 B steel by UIC 60 is to be carried out since the former has appeared prone to service fractures, particularly at welds. Since 1969 only wear-resistant steels have been introduced and failures from rail-edge fracture, black flecks, and spalls have almost disappeared. Recent work has concentrated on fatigue behaviour, and the endurance limit of materials in use is shown to rise with the tensile strength. A detailed review of fatigue behaviour is given. [German]

Heller, W (Krupp Huttenwerke AG, West Germany) *Stahl und Eisen* Vol. 94 No. 4, Feb. 1974, pp 149-151, 3 Fig., 4 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Verlag Stahleisen mbH, Breitestrasse 27, Postfach 8229, 4 Dusseldorf, West Germany

#### 01 172594

##### HEAVY FOUR-AXLE CARS AND THEIR MAINTENANCE OF WAY COSTS

Along with the study of maintenance of way costs, the author provides specific information relative to rail car size and rail deflection, rail stress, and rail contact pressure. The computation of rail deflection and stress is explained by providing numerical values for three rail sizes (90, 115, and 132 lb). The rail bending stresses for good, average, and bad tracks are discussed. The ties, ballast, and associated track items are taken into consideration in this study, and sketches are provided covering five cases with varying conditions for each of the items associated with the track structure. Rail-deflection and bending stress equations are given along with graphical illustrations showing the rail deflection as a function of tons capacity for car sizes. A similar treatment covering bending stresses is provided.

Ahlfi, RE (Illinois Central Gulf Railroad) *AREA Bulletin* Proceeding Vol. 76 Bulletin 653, June 1975, pp 622-642

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: AREA

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#### 01 172595

##### ELIMINATION OF RAIL CORRUGATIONS

The West German Federal Railroads eliminated surface damage to the rail head first by means of the Krupp grinding train consisting of one car with a power generating set and three cars equipped with rotating, elastically suspended grinding wheels, later by means of the Schorling grinding train with four grinding cars, each provided with four pairs of grinding stones 70 cm in length. Since 1970 the much more rapid Speno grinding train was used which reaches 15 km/day or 5000 km/year at an operating speed 6 to 7 km/h. The train consists of nine grinding cars with 58 rotating, tiltable grinding wheels, one car with a power generating set, one control car and one accommodation car. The treatment includes running surface and running edge. In 1971 a track length of 3555 km was treated on a grinding travel of 4875 km. [German]

Van Harlem, D *Eisenbahn Magazin* Vol. 12 No. 3, Mar. 1974, pp 14-16, 6 Fig., 2 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Alf Teloecken-Verlag KG, Roemerstrasse 9, 4000 Dusseldorf 30, West Germany

#### 01 172596

##### DAMAGE ON RAILS AND SWITCHES

An investigation of the damage on railroad rails and switches shows that the most frequent damages are fatigue fractures in the form of shelling of inner edges and transverse fractures. Since the conventional high-strength rails are no longer adequate for tracks subjected to great stresses, new special-quality rails with a yield strength greater than 600 N/sq mm were developed and have already been used with success. [German]

Laisner, H Schossmann, R *Berg- und Huettenmaennische-Monatsheft* Vol. 119 No. 7, 1974, pp 268-275, 22 Fig., 9 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Springer Verlag, 175 Fifth Avenue, New York, New York, 10010

01 172599

#### IMPROVING THE SERVICE LIFE AND RELIABILITY OF RAILROAD RAILS

The microstructure of the rails in the zone influenced by contact stresses is considered in this paper. Current metallurgical practices associated with the production of high-tensile-strength rail steels are reviewed. These include rails with high carbon (0.69 to 0.82%) and manganese (0.70 to 1.05%) contents and tensile strengths averaging between 97 and 100 kg/sq mm and wear resistance of between 0.4 to 0.5 mm per million tons of gross traffic. Practical tests on experimentally hardened rails laid in sections of high-density traffic with an outside rail curvature showed no tear-out or pitting after 120 to 140 million gross tons of traffic. It was concluded that the endurance of rails is influenced not only by the strength and other mechanical properties but also by the microstructure, and, in fact, this may often be decisive.

Lempitskiy, VV Kazarnovskiy, DS (Moscow, Khar'kov, USSR) *Russian Metallurgy* No. 1, 1973, pp 111-117, 6 Fig., 4 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Scientific Information Consultants, Limited, 661 Finchley Road, London NW2 2HN, England

01 172601

#### STUDY OF THE GROWTH OF TRANSVERSE FATIGUE CRACKS IN RAILS [Issledovaniye rosta poperechnykh ustalostnykh treshchin v rel'sakh]

The growth of transverse fatigue cracks in the active rail parts of operating railways and during laboratory tests where the rails were subjected to vibrating loads were studied, and the data taken from service and laboratory-tested rails revealed that crack-growth propagation followed an exponential law. It was also observed that a change in the degree of the gap of the transverse fatigue fissure while in its slow stages of development does not improve detectability with the defectoscope. Data are given which indicate the fissure growth in an R-65 rail as a function of stress cycles in the bending load tests. A typical break in the rail along a transverse fatigue fissure is also shown. [Russian]

Kolotushkin, SA Yoroshin, VL *Vestnik Vniit* No. 6, 1974, pp 45-47, 2 Fig., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172604

#### PRODUCTION OF HEAVY TYPES OF RAIL FROM CONTINUOUSLY CAST BILLETS OF OXYGEN CONVERTER STEEL

The process for producing K-76 rail steel which has a composition similar to M-75 (GOST 8160-63) martensite steel is described. The rail steel was smelted in a 10-ton oxygen converter at the Novo-Tula metallurgical plant. Production and heat-treatment details are given, and tests performed on rails from the steel are described. Tabulated data show a comparison between the plasticities of the transverse and longitudinal samples, thus confirming the presence of anisotropy. Tests were made, on R-75 and R-65 rails, and the results are presented. The conclusions were that the rails made from continuous cast billets of oxygen converter steel are almost as good in quality as rails produced at the Azovstal plant in regards to mechanical properties. However, the former rails are better because they are free of stitch-type nonmetallic inclusions. [Russian]

Polyakov, VV Chernyakov, VI Fradina, MG Kretova, GV Barbarov, VL Ovsyannikov, YP *Metallurgicheskaya i Gornorudnaya Promyshlennost'* No. 5, 1973, pp 15-16, 2 Tab., 1 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172605

#### MEASUREMENT OF RESIDUAL STRESSES IN RAILWAY RAILS MADE FROM HIGH-CARBON STEEL BY A NONDESTRUCTIVE METHOD (EXCHANGE OF EXPERIENCE)

This very brief article essentially cites two systems for determining the residual stresses in rail which the authors have investigated: one is based on

measuring the anisotropy of the magnetic permeability, and the other on measuring the effective values of the magnetic permeability using the high harmonics of the emf's from the signal of a pickup. In both cases superposed pickups are used. The measurement results obtained with the magnetic transducers are compared with those obtained with a strain gauge using a cutout template. Two figures show the distributions of residual stresses at the center of the testpiece cross section, as obtained with both transducers, and compare them with those obtained by the strain-gauge measurement.

Bekser, NA Yankelevic, VM Fadeev, AY Gudyrya, VA Shel', MM Smiro, AS Tokunov, VF (Ukraine Scientific-Res Inst for Metals, USSR) *Industrial Laboratory* Vol. 40 No. 7, July 1974, pp 993-994, 2 Fig., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172606

#### WHAT KIND OF RAILS TO PUT ON PARTS WITH HIGH DENSITY OF FREIGHT TRAFFIC [Kakiye rel'sy ukladyvat' na uchastkakh s v'sokoy gruzonapryazhennost'yu]

The problems of rail failures occurring because of heavy-freight-traffic densities that exceed 50 million ton-kilometers per kilometer are emphasized. Numerous data on failures of R50, R65, and R75 rails under various conditions of traffic density and amount of freight are given. The author contends that the trend for traffic-density increase has exceeded the rate at which heavy-duty rails are being laid in place of the lighter rails. The major criticism is that rails are placed under significantly more severe operating conditions than they were designed for. Recommendations are made that track structures with freight-traffic density of more than 50 million ton-kilometers/kilometer per year be divided into 3 categories: 50-80, 80-100, and over 100. Sections in this last category should be equipped only with normally hardened type R75 rails. [Russian]

Shvarov, YF Golovanchikov, AM *Pu'ti Putevoye Khozyaistvo* No. 11, 1973, pp 27-28

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

01 172614

#### RAIL LUBRICATION IN THE AUSTRIAN FEDERAL RAILROADS

In 1965, the Austrian Federal Railroads (ÖBB) began to equip track sections with rail-lubricating devices where severe wear was observed on the sides of the railhead in the outer curved rail. The various methods of rail lubrication, the lubricating device, and the positive results achieved with it are described. Calculations show that the service life of rails was increased by about 10 years and that the lubrication of rails and wheel flanges is very economical. [German]

Czuba, W *ÖBB in Wort und Bild* No. 4, 1973, pp 13-16, 4 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Austrian Federal Railways, Elisabethstrasse 9, 1010 Vienna, Austria

01 172616

#### ANALYSIS OF THE THERMAL CONDITIONS FOR THE FORMATION OF MARTENSITE BY FRICTION [Analyse der Thermischen Bildungsbedingungen von Reibmartensit]

A mathematical model based on electrical-circuit equivalence and used to calculate the minimum heat-flux density required for the formation of martensite at the surface of railroad rail steel by friction is described. With this model, it is also possible to determine the thickness of the friction-martensite layers. Conclusions drawn from the results are applicable to the formation of the brittle martensite on rails and the wheels of railroad rolling stock, such as freight cars, by braking and engine burns. Other applications are briefly discussed. [German]

Wolfstieg, U (Karlsruhe University, West Germany) *Haertere-Technische Mitteilungen* Vol. 29 No. 4, Dec. 1974, pp 263-269, 17 Fig., 1 Tab., 16 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172617

**COMPARISON OF TWO METHODS FOR ASSESSING RESIDUAL STRESSES IN RAILS**

This article reports on a study which was conducted to assess the possibility of determining the maximum residual stress on the rolling surface of the rail head, in the web, and in the central portion of the base from data obtained by examining the contraction of a longitudinal gap-cut in a rail web. The results obtained by measuring stress parameters in 119 specimens that were heat treated and straightened using different techniques were statistically processed to determine the residual stresses by gap-cut and strain-gage methods. Schematic diagrams are provided which show the machining of the specimens and the location of sensors. Scatter-field and regression-line curves are used to plot the data for residual stress in rail profile elements and gap widenings.

English translation magazine is Industrial Laboratory.

Konyukhov, AD Reikhart, VA Kaportsev, VN (All-Union Scientific Res Inst of Rail Transport) *Zavodskaya Laboratoriya* Vol. 39 No. 1, 1973, pp 117-119, 3 Fig., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Consultants Bureau, 227 West 17th Street, New York, New York, 10011

01 172618

**COMPARISON OF THE EFFICIENCY OF RAIL DEFECTOSCOPES**

The efficiency of a new form of magnetic rail defectoscope is discussed in relation to that of existing models as used on the Odessa-Kishinev railway. Comparisons are made between the effectiveness of rail-inspection units and their costs. Data are tabulated showing the types of inspection units, costs for inspection per mile of jointed and welded rails, and the number of rail defects per thousand kilometers in 1969.

Siruk, NM Rikel'man, IL (All-Union Scientific Res Inst of Nondes Test, USSR) *Soviet Journal of Nondestructive Testing* No. 2, 1973, pp 137-138, 1 Tab., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Consultants Bureau, 227 West 17th Street, New York, New York, 10011

01 172622

**AN EVALUATION OF THE STATE OF BOTTOMS OF RAILS DAMAGED BY CORROSION [Otsenka sostoyaniya podoshvy rel'sov, porazhennykh korroziyey]**

The inaccessibility of locations where corrosion frequently occurs in rails, such as the underside of the tie plate, is a major limitation to means for detecting it. This is particularly a problem where ties of pressed wood are in use. The authors of this brief paper propose a method for corrosion detection which involves the use of an ultrasonic defectoscope which indicates the depth of the corrosion present by the strength of the signal emitted. The progression of corrosion from cavity to fracture is documented, and descriptions of their experiments with the defectoscope comprise the bulk of the article. [Russian]

*Put'i Putevoye Khozyaistvo* No. 12, 1973, pp 40-41, 2 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172624

**PRODUCTION OF R-75 TYPE RAILS USING FULL HEAT TREATMENT**

Production of heavy R-75-type rails has been developed at the Nizhnii-Tagil' Works. A 9.5 ton ingot with a smooth surface was used (yielding 4 rails including discard); resulting in an increased soaking pit productivity of 7.9 percent. The ingots are rolled using the schedule for R-65 rails; the rail profile obtained in initial trials satisfied the requirements of GOST-16210-70, and the properties of the hot-rolled and heat treated R-75 rails were also up to standard. The heavy rails show less warping and curvature during quenching than the R-65 rails. The yield of prime rail in the trial production batches was 88.5 percent. The rolling mill practices used in the rail manufacturing process are described along with the means used for rail straightening. Data taken during the study of mechanical properties for the R-75 rail are presented.

Vinokurov, IY Rabinovich, DM Loshkina, NA Yuzhakov, AP Serebryakov, VS (Nizhnii-Tagil' Combine, USSR) *Stal'* No. 3, 1974, pp 260-262, 7 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

01 172625

**CONCRETE SLEEPER BREAKTHROUGH IN THE NORTHEAST CORRIDOR**

With orders placed for 1 million concrete cross ties and a number of track machines, Amtrak and the Federal Railroad Administration are beginning the rebuilding of 650 km of high speed track in the Northeast Corridor with these ties. Before deciding on concrete ties for a major part of the work, FRA carried out an analysis of three methods of track renewal that were available. FRA concluded that concrete ties would give greater safety, reliability and ride quality.

*Railway Gazette International* Vol. 134 No. 2, Feb. 1978, pp 52-55, 4 Phot.

ACKNOWLEDGMENT: Railway Gazette International

ORDER FROM: IPC Transport Press

01 172626

**CN EXPERIENCE WITH CONCRETE SLEEPERS**

With its contract to purchase 1.5 million concrete cross ties in five years, Canadian National is past the experimental stage of work with such track structures. Criteria have been established to determine which segments should be relaid with concrete or wood and efforts are now being made to mechanize the process of tie replacement as part of the complete track renewal operation. The Canron P811 track renewal train is proving more effective than the gantries and beam running on rails set to 3-m gauge previously used to handle track in 23.8-m panels.

Cann, JL (Canadian National) *Railway Gazette International* Vol. 134 No. 2, Feb. 1978, pp 49-52, 5 Phot.

ACKNOWLEDGMENT: Railway Gazette International

ORDER FROM: IPC Transport Press

01 172627

**DB TESTS COMPARE SIX CONCRETE TRACKBED DESIGNS**

German Federal Railway has started service tests on five designs of concrete trackbed installed in a 1.7 km section of the Ingolstadt-Munich main line. The five types of track represent development from existing designs installed on isolated sections of the DB network, such as those on the 250-km/h section between Bielefeld and Hamm. A simpler sixth design is undergoing preliminary tests on S-Bahn track north of Munich. Monitoring will be undertaken by two universities in the program scheduled to extend until 1982; evaluation of results will help DB select the most suitable system for use in tunnels and on viaducts along a high-speed route to be built in 1985.

Oberweiler, G (Bundesbahn-Zentralamt, West Germany) *Railway Gazette International* Vol. 134 No. 2, Feb. 1978, pp 62-64, 6 Phot.

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01 172649

**POINT CONSTRUCTIONS FOR THE SOVIET RAILWAYS**

The present state of point constructions for the Soviet Railways (SZD) is briefly characterized, with a description of the most important design features of standard points and examples illustrating them. An outlook informs on the development of constructions, in particular of high-speed points and problems connected with their solution. [German]

Moras, E *DET Eisenbahntechnik* Vol. 25 No. 10, Oct. 1977, pp 419-420

ACKNOWLEDGMENT: British Railways

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

01 172658

**A TRANSITION CURVE IN THE FORM OF A 7TH-DEGREE POLYNOMIAL [Prelazna krivina oblika polinoma sedmog stupnja]**

No Abstract. [Serbo-Croatian]

Cerovac, V *Zeleznice* Vol. 23 No. 11, Nov. 1977, pp 21-25, 4 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Zeleznice, Belgrade, Yugoslavia

01 172662

**ASSESSMENT OF TRACK CONDITION [Oberbaudiagnostik]**

General description of all factors to be taken into consideration so that decisions can be made regarding track maintenance. [German]

Funke, H. *Signal und Schiene* Vol. 21 No. 9, Sept. 1977, pp 293-297

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

01 172669

**CONSIDERATIONS ON TRACK STABILITY IN THE VERTICAL PLANE [Considerazioni sulla stabilita del binario nel piano verticale]**

Coordinating and integrating the results of Corini (1926), Mischenko (1936) and Martinet (1938) recently (1974) reproduced by Kerr, a re-proposal is made for an analysis of the stability of long-welded rail with regard to its elevation, arriving at the critical load and the length of the track involved in the crisis. After tabling these dimensions for the U.I.C. 60 track, with wooden and reinforced pre-stressed concrete sleepers, a mathematical model is discussed from which indications are derived permitting determination of the degree of safety of the track by means of direct tests. [Italian]

Conti Puorger, A. *Ingegneria Ferroviaria* Vol. 32 No. 4, Apr. 1977, pp 271-282

ACKNOWLEDGMENT: EI

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01 172923

**FEATURES OF THE INITIATION AND DEVELOPMENT OF INTERNAL FATIGUE CRACKS CONSIDERED ON THE EXAMPLES OF RAIL FAILURE**

This paper describes an attempt to study the problem of internal fatigue-crack development in a railroad rail by using a model in which the cyclic load, combined with other types of action, causes a fatigue fracture to initiate inside the metal. Previously conducted studies are reviewed that show that the initiation of cracks inside the specimen is usually observed in the presence of a strain-hardened (by rolling, surface heat treatment, chemico-thermal treatment, etc.) surface layer. Such cracks usually initiate just below the strain-hardened layer. Typical examples of transverse and longitudinal cracks are shown. The experimental work performed in this study involved subjecting rail specimens to static and cyclic loading and impact compression. Experimental results show that the white zone interlayers consist of martensite and austenite and that their structures and properties are similar to those of the white zone found in the deep layers of railhead metal. The author concludes that: (1) the formation of internal fatigue cracks conforms to the general laws of the fatigue process and the formation of internal cracks, like the formation of cracks initiated on the external specimen surface, takes place in the presence of a free surface; (2) during complex loading, the formation of the internal, slightly constrained surface is facilitated by the changes in the condition and structure of the metal due to the application of the load components and to their interaction; (3) under correct loading conditions a fatigue crack can act as a free surface for other fatigue cracks.

Translated from Problemy Prochnosti, No. 11, pp. 77-82, November 1974. Original article submitted January 30, 1973.

Ravitskaya, TM (All-Union Sci Res Inst of Metall & Mach Construct) *Strength of Materials* Vol. 6 No. 11, Nov. 1974, 5 pp, 4 Fig., 23 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Plenum Publishing Corporation, 227 West 17th Street, New York, New York, 10011

01 172924

**THE COMPOSITION OF STEEL FOR HIGH STRENGTH RAILS [O sostave stali dlya vysokoprochnykh rel'sov]**

The authors studied three groups of steels to determine whether rail steel possessing high carbon content and contact-fatigue strength together with sufficient toughness and plasticity could be produced, and whether it is possible to obtain sufficient toughness when carbon content is decreased and contact-fatigue strength is increased by alloying the steel. Illustrations are provided which show the effect of carbon on the limit of endurance during contact loading of carbon steel and complexly alloyed steels. Data are tabulated which provide some indication of toughness failure. Experimental rails of various chemical compositions were fabricated and their hardenabil-

ity, during the volume hardening in oil was determined. It was concluded that alloying of steel, within the limits studied, when carbon content is reduced cannot increase contact-fatigue strength of rails to the required level. Alloying of steel by using the conventional methods of hardening (volume, stepwise, isothermic) does not compensate for the reduction in cohesive strength and viability of rails which are observed with increases in carbon content, and does not produce the combination of mechanical properties that assure the necessary rail design strength. [Russian]

Safonova, KE Velikanov, AV Vinokurov, IY Rabinovich, DM Ravzin, YR *Vestnik VNIIZT* No. 1, 1974, pp 45-49, 4 Fig., 2 Tab., 4 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172926

**INFLUENCE OF DYNAMICS OF A TRACTION DRIVE MECHANISM OF A LOCOMOTIVE ON UNDULATING WEAR OF RAILS [Vliyaniye dinamiki tyagovogo privoda lokomotiva na volnoobraznyy iznos rel'sov]**

The authors studied the effect of drive dynamics on the undulatory wear of rails as one of the important factors contributing to a great extent to this type of rail damage. Three conclusions were arrived at on the basis of the study results: (1) intensity of undulatory rail wear depends principally on the size of the non-spring-mounted mass of the wheel pair and on the amplitude of the dynamic torque produced by vibration of the wheel pair; (2) the use of an elastic gear wheel in the traction transmission of a support-axle drive allows an almost threefold reduction in the wave formations; and (3) the most effective means of reducing wave formation is the use of a support frame traction drive of modern design which assures the least non-spring-mounted weight of a wheel pair and uniform transmission of moment from the armature of the electric motor. Mathematical expressions are given. An oscillogram of the vertical accelerations associated with the axle box and dynamic torque in the armature shaft shank during motion of a diesel locomotive along a section of track affected by wear is shown. [Russian]

Ivanov, VN *Trudy MIIZT* No. 1, 1973, pp 3-11, 1 Fig., 11 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172928

**SWITCHES WITH UIC 60 RAILS USED BY THE WEST GERMAN FEDERAL RAILROADS**

Overall length, track radius, and crossing angle of all UIC 60 switches and crossings are consistent with those of the previous switches of the Reichsbahn; a mutual exchange thus is normally possible without a change in gauge. The nominal gauge is 1433 mm, the mean tie spacing is 600 mm. For the rigid crossing three different types have been developed. The check rails are spring-mounted in transverse direction in order to reduce load peaks. For high traveling speeds, crossings with movable tips (spring-mounted and articulated) have been developed, which are used without check rails. In trials with these switches on wooden ties and concrete decks at speeds of 250 km/hr no significant shortcomings have been observed to date. [German]

Morgenschweis, O (Bundesbahn-Zentralamt, West Germany) *Eisenbahn-technische Rundschau* Vol. 23 No. 3, 1974, pp 97-104, 8 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 172929

**CUSHIONED TRACK**

Accomplishments throughout the years in the area of track cushioning provided by Butyl Rubber pads are summarized. Advantages in the use of track vibration damping are given as reduction of wear and tear imposed on the track for higher speeds and heavier tonnage. Other considerations include the reduction of rough riding, unsafe pumping of the track, and damage to equipment, ties, ballast, and subgrade of the rail. The relation between maintenance costs for track using the damping and those without cushioning is discussed. Extensive use of Butyl pads in curved rail sections

and crossings is stressed as a major improvement in the service life of the track structure.

*Progressive Railroading* Vol. 18 No. 12, Dec. 1975, pp 36-38, 5 Phot.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

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01 172930

#### IMPROVEMENT IN METHOD OF LAYING LONG WELDED RAIL IN KINKI NIPPON RAILWAY CO., LTD.

When long rails are laid at night, it is customary to bring them to the set temperature by using a rail heater after they are laid. This process requires a great deal of labor and expense. This study was performed in an effort to develop a process which would permit the simultaneous heating and laying of the rails. The report describes the process and discusses its effects and advantages. [Japanese]

Sakamoto, S *Permanent Way* Vol. 23 No. 5, 1975, pp 232-236, 8 Fig., 2 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashi-ueno, Taito-ku, Tokyo 110, Japan

01 172932

#### RAIL STEELS: MEETING REPORT

The Iron and Steel Institute's meeting on "Rail Steels", London, November 23, 1972, is briefly reviewed. The papers were grouped under three headings: "User Experience", Toughness Requirements for Rail Steels" and "New Developments". The first group of papers covered experiences of railroad administrations in five countries on how to optimize the service life of rails and mitigate the effects of cracks, wear, and other defects that can cause premature replacement of rails. A widely accepted need was expressed for a wear-resistant readily weldable rail steel. The second group of papers dealt with the use of fracture mechanics to explain the known facts regarding brittle fracture in a particular set of circumstances and how changes in the properties can in practice decrease the danger of a sudden brittle fracture. The third group of papers dealt with new developments in the field of rail steels in Western Europe. The British approach is to improve fracture toughness and has led to a lower C, higher Mn grain-refined steel. In Belgium a Low-C, low-alloy, Cu-Ni-Cr-Nb steel which will precipitation harden and is readily weldable has been developed. In Germany a rail steel containing 0.7-1.2% Cr with a yield stress in excess of 60 kg/sq mm has been developed to counteract flattening of rail heads and shelling. (A complete report of the proceedings of the meeting is at present out of print.)

Swindale, JD (British Steel Corp. Britannia Works Teesside, UK) *Iron and Steel Institute, Journal* Vol. 211 No. 5, May 1973, pp 326-328

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

01 172933

#### DISTRIBUTION OF THE RADIAL MACROSTRESSES IN RAIL HEADS AFTER HIGH-TEMPERATURE THERMOMECHANICAL TREATMENT

X-ray strain measurement is used to study the radial macrostress distribution in R-65 type rail heads as a function of the high-temperature thermomechanical treatment parameters (austenitization temperature and amount of reduction). It is demonstrated that high-temperature thermomechanical treatment produces beneficial compressive stresses in the tread contact surface of the rail head, the overall level of which increases with decrease in hardening temperature after reduction. The rail used in the study was rolled in a special prefinishing pass on the Kuznets Iron and Steel Combine's Rail and structural mill and subsequently finished on a 4-high mill at the Siberian Metallurgical Institute. The experimental data are plotted and it shows that the residual stresses tend to decrease smoothly at the center of the head. It was also concluded that the work hardening of rails by hardening in a water-air mixture results in the formation of compressive stresses with a beneficial effect on the fatigue strength of the rails.

Chelyshev, NA Gossman, AA Tsvigun, VN Nekrasov, SG *Steel in the USSR* No. 6, 1974, pp 97-99, 3 Fig., 4 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

01 172943

#### GETTING THE MOST FROM INSULATED JOINTS

While proper installation and maintenance of insulated joints may seem to be time consuming and expensive, such expenditures will produce years of trouble-free service. Among the crucial factors are appropriate patterns for supporting ties, proper installation procedures, and suitable inspection and maintenance.

Henderson, KE *Railway Track and Structures* Vol. 74 No. 2, Feb. 1978, pp 38-40, 1 Phot.

ACKNOWLEDGMENT: Railway Track and Structures

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01 172944

#### FITTING GRINDING POLICY TO THE RAIL-WEAR PROBLEM ON CURVES, GRINDING WHEEL SET ONLY ONE OF SEVERAL FACTORS

While rail grinding to eliminate corrugations was introduced 40 years ago, today's curve problems are of new magnitude. Heavier wheel loads, tie-plate cant, quality of rail and the capabilities of rail grinding equipment must all be considered in establishing a program to minimize curve problems.

Campbell, JE Thomsen, E (Campbell Associates, Incorporated);

Rivoire, A (Speno Rail Services, Incorporated) *Railway Track and Structures* Vol. 74 No. 2, Feb. 1978, pp 34-36, 2 Phot.

ACKNOWLEDGMENT: Railway Track and Structures

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01 173043

#### QUALITY RAILS FROM CONTINUOUSLY-CAST CONVERTER STEEL [Qualitaets-Eisenbahnschienen aus Stranggegossenem Konverterstahl]

Results of an examination of rails produced from continuously cast O-converter steel at a Russian works are discussed, and a comparison is made with rails produced by older processes. The rails satisfy specification requirements and possess superior cleanliness. [German]

Lempitzkij, WW Gurskij, GL Wlasov, WI Poljakov, WW Kan, JE *Neue Huette* Vol. 18 No. 1, Jan. 1973, pp 52-63, 2 Fig., 4 Tab., 1 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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01 173044

#### SPEED-UP COMMUTER TRAINS IN A CIVIL RAILWAY

This work is a study, by item, of the direct restrictive factors in the way of improvement of the operating speed of the commuter trains on civil railways. The factors related to the rails will include the safety against derailment, vibration, traveling comfort in relation to oscillation, and track strength with regard to resistance to breakage. An inquiry has been made in this study into the possibility of train operation at the maximum speed ranging from 120 to 130 km/hr. As the train speed is increased, track failures increase. Thus, it is necessary to improve the tracks which still remain at the lowest level of structural requirements. [Japanese]

Okamoto, K *Traffic Techniques* Vol. 30 No. 4, 1975, pp 106-109, 1 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Traffic Association, Tokyo, Japan

01 173047

#### RAILROAD FAILURE PREVENTION PROGRAM

The objective of the program here is to establish an information base which will contribute to the understanding of causes of rail and rail component failure and assist in the development of more effective methods of controlling failures. Current emphasis is on the rail and freight car truck components. Eighteen activities currently underway in component evaluation and inspection are briefly noted and/or described. One of the activities, dealing with rail technology programs for fiscal 1975 involves an in-depth review and analysis of all published works during the past ten years in four specific areas of rail technology: nondestructive inspection, stress/strain measurements and analysis, material failure behaviour, and rail production practices.

Among the various concepts of defect and flaw detection, current ultrasonic rail methods are discussed. Information is given concerning an advanced ultrasonic transducer which is being developed to improve sonic detection of vertical split heads and weld defects. The transducer and associated signal processing equipment is intended to be incorporated in an existing rail inspection car for future tests.

Lavery, AL Steele, R Lyons, JW Ceccon, HL *Materials Evaluation* Vol. 33 No. 4, July 1975, pp 163-167, 3 Fig., 18 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: American Society for Nondestructive Testing, 914 Chicago Avenue, Evanston, Illinois, 60202

DOTL JC

#### 01 173049

##### RAIL PRODUCTION AT THE NO. 2 LARGE SECTION MILL AT FUKUYAMA WORKS

The role which Nippon Kokan's new heavy rail production facility, Fukuyama No. 2 large section mill, plays in the development of Japan's high-speed railway system is discussed. The production equipment and processes employed by the mill are described. Mention is made that the rolling mill has sufficient space such that rail lengths of 50 and 100 meters is no longer a problem. In order to achieve more efficient production, a study was conducted by the steelmaking, blooming/slabbing, and rolling divisions of the mill to determine the quality of rails which could be produced from 13-ton rather than the 7 to 8-ton ingots which were being used. Areas studied included the degree of segregation, sulfur print, macropattern, nonmetallic inclusions, hydrogen content, microscopic detection of the presence of Fe<sub>3</sub>C, and the mechanical properties throughout the entire length of the rail. Prototype rails produced from the 13-ton ingots were tested at the Research Center of the Japanese National Railways and found to be acceptable. Bar charts showing the mechanical properties, dimensional accuracy, and quality of the rails are given.

Gino, T Gocho, M (Nippon Kokan KK, Japan) *Iron and Steel Engineer* Vol. 52 No. 6, June 1975, pp 25-31, 10 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

#### 01 173053

##### BEAM AND RAIL ROLLING MILL OF THE HAYANGE PLANT OF SACILOR [Le train a poutrelles et a rails de l'usine d'Hayange (SACILOR)]

This paper describes a production line for heavy rolled sections, whose construction and successive additions and modifications first aimed at the production of beams, then of rails by the Stambach process have extended over a dozen years. Rolling schedules and pass designs are given. [French]

Lossent, A *Revue de Metallurgie* Vol. 71 No. 10, Oct. 1974, pp 733-748, 12 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: ESL

#### 01 173055

##### A METHOD FOR MEASURING SPRING AND DAMPING CONSTANT OF TRACK

The author proposes a method for determining the spring coefficient of the spring system of the track, the vibration attenuation coefficient, and the contact spring coefficient between the wheel axle and the rail utilizing a wheel axle dropping test. The results obtained based on existing data are described. In this work, a model was set up for the spring system of track, taking note of the form of the impact force generated by the dropping of the wheel axle and its characteristics. A theoretical analysis was conducted with the model, and it has been found that by drawing on the existing data, it is possible to calculate the spring co-efficient, the diminution coefficient, and the contact spring co-efficient between the wheel axle and the rail, which are characteristic values of the spring system of the track. [Japanese]

Sato, Y (Japanese National Railways) *Permanent Way* Vol. 23 No. 7, 1975, pp 360-364, 16 Fig., 1 Tab., 2 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

#### 01 173056

##### POSSIBILITIES IN THE DEVELOPMENT OF RAILS FOR A HEAVY DUTY RAPID TRANSIT SYSTEM [Möglichkeiten der Schienenentwicklung für einen Hochleistungsschnellverkehr]

A heavy-duty rapid transit system imposes additional requirements on rails. The possibilities of developing air-hardened rail steels are discussed from the material point of view. The results obtained from tests conducted with company-manufactured rails of pearlitic steels, transformed steels, and low-carbon steels are disclosed. [German]

Heller, W *Technische Mitteilungen Krupp, Werksberichte* Vol. 33 No. 2, May 1975, pp 73-77, 6 Fig., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: ESL

#### 01 173057

##### IMPROVEMENT OF TRACK MAINTENANCE USING CURVE METHODS

Investigations have shown that horizontal, and vertical components of acceleration occur as a result of unevenness of a rail line. A rail line must be considered along with centrifugal force if a smooth ride is to be achieved. The Murmansk section of railroad, has more than 50 percent, and in some cases, 70 percent of the curves with radii between 230 and 700 meters, and the intervals between curves are short. This article gives Shperling's formula for calculating a smoothness factor, and shows some of the curves which are recorded. Also included are suggestions of changes that should be made in maintenance standards needed to improve track conditions at curves. Graphs are provided which show Shperling's curve for smoothing factor calculation, and data taped by the track geometry measuring car for curves of 625 and 714 meters in radii. [Russian]

Sharoyko, VS Kupriyanov, NV *Put'i Putevoye Khozyaistvo* No. 5, 1974, pp 23-24, 4 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

#### 01 173383

##### TRACK FOUNDATION STRESSES UNDER VERTICAL LOADING

The article proposes a limited programme for calculating track-bed stresses against the background of the following conditions: the materials are flexible, the reactions between rail, fastenings and ballast are vertical, there is displacement continuity between the fastening and ballast, and between the ballast and track-bed, the rail has a given length and comprises between 7 and 9 fastenings. The preparation of the basic equations is accompanied by an assessment of the basic programme and a practical analysis with converging field and laboratory results.

Chu, KH *Rail International* No. 12, Dec. 1977, pp 617-626, 3 Tab., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

#### 01 173384

##### RAIL CORRUGATION [Riffelbildung bei Schienen]

Presentation of a new theory on rail corrugation, making it possible to assess the effects of levelling, sub-soil rigidity, axle-loads and wheel diameter. This theory is based on stresses occurring in the rail bed during manufacture (and which change during the wear process), also on stresses (due to loads) caused by the wheels. [German]

Eisenmann, J *Mitteilungen des Pruefamt Bau Landverkehrswegen* Vol. 29 1977, pp 1-16, 9 Phot., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Technical University of Munich, Arcisstrasse 21, D-8000 Munich, West Germany

#### 01 173385

##### LATERAL RESISTANCE OF THE TRACK: THE PROBLEM OF BALLAST STABILISATION [La resistance laterale de la voie ferree.]

Research carried out by SNCF in laboratory and on open track to speed up track consolidation artificially has resulted in the development of two stabilizers which are examined by the author from the standpoint of performance. [French]



Janin, GJ *Revue Generale des Chemins de Fer* Oct. 1977, pp 535-552, 13 Tab., 26 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

01 173392

**SIMPLIFIED RAIL-TRACK MAINTENANCE THROUGH INTRODUCTION OF A TURNOUT IN ANTI-FRICTION METAL**  
[Vereinfachte Wartung der Gleiswege durch Einfuehrung der Gleitmetall-Weiche]

The usual method of lubricating turnout bearing blocks is oil consuming, causes large-scale ground pollution and is costly. Maintenance costs are reduced tenfold with the affixing of a metal layer on the bearing blocks. [German]

Sixt, B *Eisenbahningenieur* Vol. 28 No. 10, 1977, pp 432-438, 7 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

01 173407

**FAR NORTH LINE OPTS FOR PLASTIC TIE PLATES THROUGHOUT**

Decision for the track modernization project at White Pass & Yukon made on basis of economy following two years of testing on heavy grades and sharp curves is discussed. The entire length of this single-track, narrow-gage (3 ft) line, 110 miles long will be laid with Koppers high-density polyethylene tie plates.

*Railway Track and Structures* Vol. 73 No. 10, Oct. 1977, pp 24-25

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

01 173411

**DETERMINATION OF THE BALLAST-LAYER DENSITY USING RADIOMETRIC MEASUREMENT METHODS** [Die Ermittlung der Lagerungsdichte in Gleisbettungen mit Hilfe radiometrischer Messverfahren]  
No Abstract. [German]

Cabos, HP *Mitteilungen des Instituts Bau Landverkehrswegen* DB: Dok 4661, 1977, 129 pp, 24 Tab., 76 Phot., 80 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Technical University of Munich, Arcisstrasse 21, D-8000 Munich, West Germany

01 173412

**EXAMINATION AND CONSTRUCTION OF BALLASTLESS TRACK FOR HIGH SPEEDS** [Erforschung und konstruktive Durchbildung eines schotterlosen Oberbaues fuer hohe Geschwindigkeiten]

Phase 1: DUWE, Bernd: Experimental and theoretical research into the deformation and stresses of ballastless track for speeds of up to 250 km/h. Phase 2: KUCHLBAUER, Seb: Laying of rails adjustable laterally and heightwise for high-speed lines. Track in tunnels and on bridges. Explanation of a type of ballastless track developed by the Munich Research Centre and tested at Rheda Station. Description of rail fastenings adjustable laterally and heightwise. [German]

*Mitteilungen des Pruefamt Bau Landverkehrswegen* DB: Dok 4662, 1977, 205 pp, Tabs., Photos., 26 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Technical University of Munich, Arcisstrasse 21, D-8000 Munich, West Germany

01 173420

**THE ALUMINO THERMIC WELDING OF RAILS**

Reviews the history and development of the thermit welding process and its application to the joining of rails.

Lugg, P *Permanent Way Institution, Journal* Vol. 95 No. 3, 1977, pp 175-185, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Derry and Sons, Limited, Canal Street, Nottingham, England

DOTL JC

01 173423

**HIGH-SPEED TESTING ON THE GERMAN FEDERAL RAILWAY. RESULTS AND CONCLUSIONS** [Schnellfahrversuche der Deutschen Bundesbahn-Ergebnisse und Folgerungen]

The DB, in anticipation of passenger train speeds being increased to 200 km/h, has made a 30 km stretch of double track on the Hamm-Bielefeld line available for testing. Attention is being paid in tests to the subsoil and track as well as to the behaviour of vehicles and their effect on the track. Catenaries and radio links have also been studied. The article gives a survey of the results obtained. [German]

Haefner, F *Archiv fuer Eisenbahntechnik* No. 32, 1977, pp 53-68, 25 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

01 173429

**DIRT-REMOVING TRAIN FOR THE BRUSSELS METRO** [Train depoussiéreur pour le metro de Bruxelles]

As part of the policy to keep the ballast clean, particularly in stations, a dirt-removing train has been put into service, composed of three permanently-coupled vehicles. Litter and dust are first raised by a blast of air, then collected by means of two suction devices fitted one to each end vehicle, and finally fed through a pipe system into rubbish bins in the central vehicle. These bins are taken out at the depot and emptied. [French]

*Revue Belge du Transport* No. 3, 1977, pp 3-5, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Association des Ingenieurs de l'Univ. Libre, 87, Avenue A. Buyl, B-1050 Brussels, Belgium

01 173597

**DEVELOPMENT OF THE RAIL FASTENING DEVICE FOR DIRECT FASTENED TRACK ON THE STEEL BRIDGE**

To reduce track maintenance requirements on bridges, a rail fastener which attaches directly to bridge girders and eliminates cross ties has been developed. A standard design adaptable to continuous welded rail on long bridges has been produced. The design, structural features and test results are described.

Umeda, S Aihara, K Kumazaki, H *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Rpt. No. 1025-76, Sept. 1977, pp 105-108, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

01 173780

**FEASIBILITY STUDY OF ON-SITE FLAME HARDENING OF RAIL**

The results of a preliminary analytical study indicate that it is feasible to flame harden or stress relieve railroad tracks in the field by towing a heat source, consisting of an array of fuel gas torches, along the track at constant speed. The study indicates that it is desirable to use as long a heat source as is practical. This permits the use of high source speeds (thereby minimizing the time required to process a given length of rail) without producing excessive hot spot temperatures on the rail, and without requiring inordinately high heat fluxes. For flame hardening, a source having a length of 40 ft. (12 m) may be towed at a speed in excess of 25 fpm (0.13 m/s). The heat flux required is approximately 400,000 Btu/hr-sq ft. (1260 kw/sq m), which is well within the capabilities of fuel gas (acetylene, propane, etc.) flames. For stress relieving, the time "at temperature" is significantly longer than for flame hardening; hence, the source speeds are lower. A 40-ft (12-m) source may be towed at 4 fpm (0.02 m/s); the heat flux required is approximately 90,000 Btu/hr sq ft. (280 kw/sq m).

Contributed by the Rail Transportation Division of ASME for presentation at the IEEE-ASME Joint Railroad Conference, St. Paul, Minnesota, April 11-13, 1978.



Hollworth, BR (Clarkson College of Technology); Steele, RK  
(Transportation Systems Center)  
American Society of Mechanical Engineers Conf Paper 78-RT-8, 1978,  
8 pp, 6 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

**01 173813**  
**IN-TRACK WELDING FOR MAIN, YARD TRACKS ON CHICAGO BELT**

After successful performance was found with continuous welded rail in main tracks, Belt Railway of Chicago has undertaken a program of field welding remaining main track and important yard tracks with a mobile flash-butt welding unit.

*Railway Track and Structures* Vol. 74 No. 3, Mar. 1978, pp 40-42, 7 Phot.

ORDER FROM: ESL

DOTL JC

**01 173815**  
**BATTER AT CWR WELDS? HERE'S HOW TO MAKE REPAIRS**  
Some continuous welded rail develops battered butt weld areas which gradually increase in length and depth, depending on wheel loads and speeds. With an eight-step procedure, using a core wire with a semi-automatic wire-feed welding unit, deposits of the proper hardness can be applied when used in conjunction with a controlled pre-heat and post-heat procedure.

*Railway Track and Structures* Vol. 74 No. 3, Mar. 1978, pp 36-37, 7 Phot.

ORDER FROM: ESL

DOTL JC

**01 173816**  
**FOR A MODERN YARD: MODERN CONSTRUCTION; MODERN METHODS**  
Construction of the new Rice yard of the Seaboard Coast Line at Waycross, Ga., is described. The methods and machines of contemporary track construction are adapted to yard tracks, including the use of laser beams for automatic control of tamping and lining machines. Tracks are being laid with continuous welded rail and field welding eliminates as many joints as possible in the yard.

*Railway Track and Structures* Vol. 74 No. 3, Mar. 1978, pp 20-24

ORDER FROM: ESL

DOTL JC

**01 174193**  
**RAILROAD BALLAST AND SUBGRADE SUPPORT**  
A rational design method for railroad ballast and subgrade support based on the Casagrande classification of soils is presented. Ballast increments for upgrading existing track for soft spots and increased wheel load are also examined, as are ballast cleaning undercutting depths. As far as can be judged existing practices for ballast depths concur with the conclusions.

Raymond, GP *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. GT1, Proc Paper 13471, Jan. 1978, pp 45-50

ACKNOWLEDGMENT: ASCE  
ORDER FROM: ESL

DOTL JC

**01 174206**  
**ANNUAL DISCRETIONARY TRACK MAINTENANCE MODEL**  
This computer program evaluates return on investment of alternative track improvement projects and develops the annual track maintenance program. The primary aspect is development of a track data base and cost factors involved in track upgrading as compared with operating costs.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

**01 174372**  
**RESPONSE OF RAILROAD BALLAST TO VERTICAL VIBRATION**

The effect of vertical vibration on some railroad ballasts in laboratory tests is presented. The ballasts were found to behave in a similar manner to that previously reported for sands, i.e., peak acceleration was the main parameter affecting densification. For unsurcharged ballast, little increase in density occurred at peak accelerations below 1 g, a large increase in density occurred at peak accelerations between 1 g and 2 g, but little further increase in density occurred at higher peak accelerations. Surcharge pressures about 50 psi (345 kN/sq m) led to an increase in the peak acceleration needed to produce a substantial increase in density. Gradings modeled on the Talbot grading equation with  $n$  values between 0.7 and 1.0 gave the highest densities under vibration. There was some downward migration of fine particles during vibration. The amount of segregation appeared to be independent of grading but dependent on the particular ballast tested.

Gaskin, PN Raymond, GP Powell, AG *ASCE Journal of Transportation Engineering* Vol. 104 No. TE1, Proc Paper 13500, Jan. 1978, pp 75-87

ACKNOWLEDGMENT: ASCE  
ORDER FROM: ESL

DOTL JC

**01 174382**  
**GEISMAR SYSTEM CUTS RELAYING TIME FOR TURNOUTS**  
An ingenious system of trolleys and hydraulic jacks makes it possible to replace pointwork during short possession times.

*Railway Gazette International* Vol. 134 No. 2, Feb. 1978, pp 60-61, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**01 175999**  
**PARAMETRIC STUDY OF TRACK RESPONSE**  
This report was prepared as part of the Improved Track Structures Research Program managed by the Transportation Systems Center. The report presents results from a parametric study of track response using a comprehensive track analysis model. Track response parameters include rail and tie bending moments, rail displacement, tie rail seat load, and the distribution of stresses in the ballast and subgrade. The effects of variations in tie size, tie spacing, ballast depth and rail fastener stiffness are presented in graphs suitable for track design trade-off studies. Alternative wood and concrete tie track configurations are evaluated using equivalent maintenance criteria. Maintenance criteria for track surface deterioration were reviewed to select ballast and subgrade stress parameters which can be related to track settlement rate for service loads. Formats for cumulative settlement criteria are evaluated using available laboratory data for the behavior of ballast and subgrade materials under repeated loads. Track lateral strength requirements for wood and concrete tie track are also discussed.

Prause, RH Kennedy, JC  
Battelle Columbus Laboratories, Transportation Systems Center, Federal Railroad Administration Intrm Rpt. DOT-TSC-FRA-77-75, FRA-ORD-77-75, Dec. 1977, 118 pp, Figs., Tabs., Refs., 1 App.

Contract DOT-TSC-FRA-1044-1

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279316/4ST, DOTL NTIS, DOTL RP

**01 176001**  
**AN ANALYTICAL AND EXPERIMENTAL EVALUATION OF CONCRETE CROSS TIE AND FASTENER LOADS**  
This report has been prepared as part of the Improved Track Structures Research Program sponsored by the Office of Rail Safety Research of the Federal Railroad Administration. The report covers a review and evaluation of track analysis models for predicting tie and fastener loads. The principal track analysis model selected includes the effects of tie bending, ballast, depth, and ballast and subgrade elastic properties in a unified manner. The report also includes a statistical description of track loads measured for revenue traffic operating on three sections of concrete tie track on the Florida East Coast Railway. Measured tie loads are compared to maximum design loads used in current specifications for concrete ties and fasteners.  
Prepared in cooperation with Bechtel, Inc., Gaithersburg, Md. See also report dated Apr 77, PB-271393.

Prause, RH Harrison, HD Kennedy, JC Arnlund, RC  
Battelle Columbus Laboratories, Bechtel, Incorporated, Transportation  
Systems Center, Federal Railroad Administration Intrm Rpt. FRA-  
/ORD-77/71, Dec. 1977, 356 pp, Figs., Tabs., Refs., 9 App.

Contract DOT-TSC-1044

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-279368/5ST, DOTL NTIS, DOTL RP

01 176685

**ADAPTING TRACK FOR HIGH SPEED RUNNING [Podgotovka  
puti k povysennym skorostjam dvizeniya]**  
No Abstract. [Russian]

Borodavko, VS Polykeev, AG *Zheleznodorozhnyi Transport* No. 12,  
1977, pp 27-30, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novo-Basmanaya  
Ulitsa 2, Moscow B-174, USSR

01 176688

**CONCRETE SLEEPERS [Die Betonschwelle]**  
No Abstract. [German]

Barkau, E (DB) *Deine Bahn* Vol. 5 No. 12, 1977, pp 726-729, 13 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Eisenbahn-Fachverlag, Am Linsenberg 16, 6500 Mainz,  
West Germany

01 176691

**STATIC TESTS OF RAIL FASTENERS FOR SUPPORTING AND  
SLEEPER PLATES [Statische Pruefungen von Schienenbefestigungen  
fuer Trag-und Schwellenplatten]**  
No Abstract. [German]

Franz, J *DET Eisenbahntechnik* Vol. 25 No. 12, 1977, pp 490-492, 4 Fig.,  
3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Ber-  
lin, East Germany

01 176899

**CALCULATION OF BALLAST BED STRESSES UNDER  
VERTICAL LOADS BY THE COEFFICIENT OF RIGIDITY**

A method is described for calculating ballast bed stresses by the coefficient  
of rigidity, developing a system of linear equations on the condition of  
deformation that the sleeper deflection in any point must be equal to the sum  
of compression of the ballast bed and sinking of the subgrade. By this  
method the bottom pressure distribution below the sleeper can be calculated,  
and, from it, the ballast pressure distribution between bed and subgrade. The  
stress distributions below a timber cross tie and a concrete one are illustrated  
by an example. [German]

Mildner, K *DET Eisenbahntechnik* Vol. 26 No. 1, Jan. 1978, pp 14-17

ACKNOWLEDGMENT: British Railways

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Ber-  
lin, East Germany

01 176900

**THE THEORY OF TRACK CREEPING**

By analysing measurements an idealized description is given of the function  
of single-track creeping for various states, developing parameters of elastic  
and plastic properties and creeping ranges as a uniform basis for various  
mathematical models of the creeping function. A non-linear model illustrates  
a track section loaded in longitudinal direction. Two methods are presented  
for a practical determination of parameters of creeping functions in track  
sections by means of simple linear models. A comparison with measuring  
results shows that the theoretical relationships developed are useful.  
[German]

Talke, W Fritsche, K *DET Eisenbahntechnik* Vol. 26 No. 1, Jan. 1978,  
pp 21-24

ACKNOWLEDGMENT: British Railways

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Ber-  
lin, East Germany

01 176915

**FOUNDATIONS FOR OVERLAND TRANSPORT SYSTEMS**

[Cimentaciones para estructuras viales]

This chapter deals with foundations for structures for road and railway  
construction, in particular for bridges and over-and underpasses to be built  
along their path. Basic concepts of foundations in general are reviewed, such  
as load-bearing capacity, settlement, load tests and a few major techniques  
are presented which have only limited application in the field of road  
construction. Practical aspects of foundation design and methods for water  
control in excavations are also dealt with. For the covering abstract of the  
book see IRRD abstract no 231651. [Spanish]

Rico, A Delo, AA

LIMUSA Analytic Vol. 2 1977, pp 19-97, 67 Fig., 14 Tab., 19 Phot., 103  
Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231652), Ministry of Public Works,  
Spain

ORDER FROM: LIMUSA, Arcos de Belen 75, Mexico DF, Mexico

01 176916

**THE BALLAST COEFFICIENT AND ITS APPLICATION TO THE  
STUDY OF RAILWAY TRACK MECHANICS [El coeficiente de  
balasto y su aplicacion al estudio de la mecanica de una via ferrea]**

The studies carried out to date on the dependent relationship existing  
between the ballast coefficient, or the track modulus and the parameters on  
which they depend are critically analysed. Referring to the present state of  
knowledge, the author makes a historical analysis divided into two periods  
(1867-1940 and 1940-1975), in which he covers the theories of the various  
researchers who have worked on the subject. In more detail he examines  
critically the ballast coefficient, dealing with its origin and meaning, the first  
experiments, the formula of Wasiutynski, the observations of Bauchal and  
Eisenmann's results, relating them to the Winkler School. Later he deals  
with the track modulus, its origin and meaning; the first experiments,  
Wasiutynski's results, the studies of M.I.V. (1967) and Timoskenko's values  
and the relationship between the track modulus and the stiffness coefficient  
of a sleeper. Finally, critical comments are made on the various theories and  
methodologies previously explained and an analysis is set forth on the  
advantages and limitations which both the method of the ballast coefficient  
and that of the stiffness coefficient present. It is concluded, in synthesis, that  
the only way of accounting for the specifications of the various elements  
(track-survey, ballast-platform) is by applying multi-layer elastic theories.  
[Spanish]

Lopez, A *AIT-Revista Analytic* No. 12, Oct. 1976, pp 53-68, 4 Fig., 5  
Tab., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231682), Ministry of Public Works,  
Spain

ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer  
38, Madrid, Spain

01 177029

**BR REMODELLED TRACK-LAYING PLANT ENTERS 1ST  
STAGE**

Specialized rail-mounted cranes, gantries and track-laying machines which  
have been developed for British Railway's current track maintenance  
programs are going into service. All are self-powered but designed to be  
moved readily in trains. The jib-cranes will be used for switch and crossing  
replacements; gantries and track-laying machines will be used for track  
renewals.

Price, J (British Railways Board) *Railway Engineer* Vol. 3 No. 1, Jan.  
1978, pp 9-12, 5 Fig.

ORDER FROM: ESL

DOTL JC

01 177030

**MAINTAINING A GOOD BALLAST BED IS WORTHWHILE**

Any type of railway track structure needs a good base which does not have  
to be ballast although this is the cheapest material. A good ballast bed  
requires good drainage, protection against frost, removal of fines and initial  
use of good-quality material of large grain size. A combination of ballast  
cleaning and consolidating machines used regularly can reduce other  
maintenance costs and improve ride of vehicles with consequent reduction  
in wear on rolling stock.

Schubert, E (Austrian Federal Railways) *Railway Engineer* Vol. 3 No. 1, Jan. 1978, pp 14-15, 3 Fig.

ORDER FROM: ESL

DOTL JC

01 177034

#### BETTER BALLAST FOR BETTER TRACK

Growing appreciation of the importance of high-quality ballast that does not degrade into rounded particles is discussed, along with tests that can measure such material. Specifications of the American Railway Engineering Association have been revised to establish new material standards and tests. Maintenance cycles and maintenance practices need to be better related to the performance of ballast.

*Progressive Railroading* Vol. 21 No. 5, May 1978, pp 63-64, 2 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

01 177035

#### ENERGY-ABSORBING BUMPING POSTS

Friction-type bumpers, designed to yield on impact with a progressive rate of retardation, have been tested by the New York City Transit Authority. The German-developed units are of varying designs including models for dead-end passenger terminal tracks.

*Progressive Railroading* Vol. 21 N May 1978, pp 71-72, 6 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

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01 177037

#### ON THE PREDICTION OF THE FATIGUE LIFE OF RAILS

This paper introduces a methodology for calculation of the fatigue life of rails in service. Increased wheel loads has increased fatigue-related problems. A service environment is represented by means of an environmental load spectra which is then converted to stresses at the rail. Although the paper is limited to flexural rail stresses, the methodology can be extended to other states of stress. Once the spectra is established, rail life is calculated by means of Miner's linear cumulative damage theory. Along with showing the detrimental effect of increased wheel loads, the need for matching rail size to loads is necessary to minimize rail defects.

Abbott, RA Zaremski, AM *AREA Bulletin* Proceeding Vol. 79 No. 666, Jan. 1978, pp 191-203, 7 Fig., 1 Tab., 8 Ref.

ORDER FROM: ESL

DOTL JC

01 177038

#### ECONOMICS OF PRODUCING WELDED RAIL BY IN-TRACK WELDING

The experience with in-track welding of rail by the flash-butt welding process; by gas welding and by Thermit process are discussed. Almost no experience in the U.S. was reported for gas welding but the other two methods have been used extensively and operational and economic analyses have been possible.

Rougas, M Dick, MH Liljeblad, G Myers, ET Rees, FL Stackhouse, WB Vaughan, JD, Jr *AREA Bulletin* Proceeding Vol. 79 No. 666, Jan. 1978, pp 259-262

ORDER FROM: ESL

DOTL JC

01 177157

#### ANALYSIS OF RAIL TRACK STRUCTURES (ARTS)--USER'S MANUAL

The computer program ARTS for the static linear analysis of rail track structures is presented. The finite element method is used and a choice of hexahedral, tetrahedral and beam elements is provided which can model non-homogeneous isotropic elastic material properties. A typical sample analysis has been selected to demonstrate the general problem solving procedure and the input and output descriptions. The program has been prepared in such a manner that an extension can be made to a non-linear analysis capability which would model the ballast's stress path dependence and its no tension characteristic.

Raymond, GP Turke, DJ

Canadian Institute of Guided Ground Transport Manual CIGGT-78-8, Apr. 1978, 70 pp, 12 Fig., 1 Tab., 3 App.

Contract TDC-7551

ACKNOWLEDGMENT: CIGGT

ORDER FROM: CIGGT

DOTL RP

01 177197

#### SOIL-STRUCTURAL INTERACTION AND CONCRETE TIE DESIGN

Experimental data and theoretical argument are presented to show that the optimum length for a concrete tie of uniform cross section is 1.67 to 1.71 times the distance between the two rail center lines. A design methodology is presented and evaluated on available data on in-track performance. It is shown that the design bending moments specified for curves and large spacings by the American Railway Engineering Association's Concrete Tie Committee are questionable. This is particularly true for center line values used for ties carrying the heavy wheel loads characteristic of North American traffic.

Raymond, GP (Queen's University, Canada) *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. 2, Feb. 1978, pp 249-265, 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

01 178136

#### DESIGNING FOR SPEED AND HIGH LOADS

In upgrading existing lines and building new ones, the inevitability of higher speeds and heavier cars must receive maximum attention. The development of new equipment should be kept within the existing technology of wheel on rail. Track geometry and track components determine the ability of track to sustain any level of operation. The role of concrete cross ties and concrete slab track are discussed, along with the potential in conventional track components. Future requirements for signaling appear beyond existing system capabilities.

Semrau, A (Polish State Railways) *International Railway Journal* Mar. 1978, pp 13-22

ORDER FROM: Simmons-Boardman Publishing Corporation, 508 Birch Street, Bristol, Connecticut, 06010

DOTL JC

01 178142

#### APPROACH TO STRUCTURAL DESIGN OF RAIL-FASTENING DEVICE

No Abstract.

Umeda, S *Permanent Way* No. 72, Dec. 1977, pp 15-27

ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

DOTL JC

01 178143

#### CHALLENGE TO IMPROVED TURNOUTS (HARBINGER FOR DEVELOPMENT OF TURNOUTS)

No Abstract.

Itoh, M *Permanent Way* No. 72, Dec. 1977, pp 1-14

ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

DOTL JC

01 178272

#### MAINTENANCE OF PERMANENT WAY INSTALLATIONS ON SNCF [L'entretien des installations fixes a la SNCF]

This issue, which contains an introduction by Mr. J. Alias, SNCF Way and Works Manager, features the following articles: M. Cexus: Track maintenance; O. Weber: Signalling installation maintenance policy; P. Boissonnade: Maintenance of fixed electric traction installations; G. Verrier: Maintenance of earthworks; E. Chambron and J. Thomas: Tunnel and bridge maintenance techniques; R. Aupied: Permanent way workshops/stores--Their contribution to maintenance techniques. [French]

See also RRIS 01-178531 and 01-178532, Bulletin 7802.

*Revue Generale des Chemins de Fer* Jan. 1978, pp 1-73, 66 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

#### 01 178275

##### COMPUTER PACKAGE FOR TRACK LAYOUT

In this article, the author considers the possible use of computers for track layout and switches in a yard. He goes on to describe some applications and the advantages of this technique.

Holzinger, R *International Railway Journal* Mar. 1978, pp 43-44, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

DOTL JC

#### 01 178423

##### IOWA RAILROAD TRACK GEOMETRY RATINGS

Comprehensive test results from the use of a track geometry car by the Iowa Department of Transportation are given, along with the explanation of the method of rating track. The track geometry rating is calculated for each one-mile segment of track in the state. The final rating is a composite of separate calculations for track gage and cross level, with equal weight being given each. Details for rating of 6,550 miles of Iowa track are given; an additional 960 miles have not been rated for various reasons. Inspectors rated 58.4 percent of all track in good condition, 34.1 percent in fair condition and 7.5 percent in critical condition.

Iowa Department of Transportation July 1977, 436 pp

ACKNOWLEDGMENT: Iowa Department of Transportation

ORDER FROM: Iowa Department of Transportation, Planning and Research Division, Des Moines, Iowa, 50319

DOTL RP

#### 01 178425

##### THE EFFECT OF POINT BLADE JOGGLE ON POSITION AND RESISTANCE TO THROWING [Wplyw przegiecienia iglicy na jej polozenie i opory przedstawiania]

Results of a study of the relationship between the joggle of a switch points 60-300-1:9 and its position against the base plate. It appears that the joggle stipulated in standards should not be considered as valid for all lengths of points especially those with an ordinary lock as this may be contrary to the need for play, which may be small, between the blade and the base plate. Joggle has a considerable effect on the mechanical characteristics of the blade and determines its elastic resistance when points are thrown. [Polish]

Skopinska, H Szafranski, W *Przegląd Kolejowy Drogowy* Vol. 24 No. 9, Sept. 1977, pp 242-248, 8 Fig., 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Wydawnictwa Komunikacji i Łączności, Kazimierzowska Ulitsa 52, Warsaw 12, Poland

#### 01 178426

##### ELECTRIC ENERGY SAVING IN THE USE OF POINT HEATER RACKS [Einsparungen von Elektroenergie bei Weichenheizungsanlagen]

Temperatures between 2 and 6 degrees C are sufficient to keep points clear of snow and ice. Point heating at a temperature between these values is made possible by a temperature-sensor fitted directly on the web of the stock rail. The heating process varies upward or downward depending on the general temperature. The rail temperature is measured by means of a temperature monitor, thereby making it possible to maintain point heating within given limits under light snow conditions. [German]

Kiessig, H Reiz, A *Signal und Schiene* Vol. 21 No. 12, 1977, 2 pp, 1 Fig., 2 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

#### 01 178433

##### TRACK SUPERSTRUCTURE STUDIES IN CONNECTION WITH HIGH SPEEDS [Oberbautechnische Untersuchungen fuer hohe Geschwindigkeiten]

Following the decision to increase passenger-train speeds and build new lines, the DB initiated multidisciplinary research into track components, so

as to define technical conditions for speeds of up to 200 km/h as well as the technical and economic optimisation of these components. There is little doubt that the development of ballasted track will be economically viable in the short and medium term (hence the DB policy to intensify studies in this direction); rigid track still requires much technical research. [German]

Froehlich, P *Die Bundesbahn* Vol. 54 No. 2, 1978, pp 139-143, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

#### 01 178434

##### GOOD TRACK MAINTENANCE BASIC TO A COMMERCIAL RAILWAY [Der gut erhaltene Fahrweg: Voraussetzung fuer eine Leistungsfaeheige Eisenbahn]

The DB's objectives, consistent with the requirements of a commercial railway, imply maintaining the permanent way in good condition. Renewal, replacement and maintenance of track and switches are planned on the basis of priority criteria: Safety, productivity, profitability. The effective application of economic criteria ensures that the cost of maintenance is as economical as possible. This is obtained by using more competitive materials and by adopting improved production methods and work standards. [German]

Naue, KH *Die Bundesbahn* Vol. 54 No. 1, 1978, pp 15-20, 8 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

#### 01 178442

##### CURRENT TRACK TECHNOLOGY AND NEW IMPROVEMENT POSSIBILITIES [Die Fahrwegtechnik von heute und Moeglichkeiten einer weiteren Verbesserung]

No Abstract. [German]

Weiss, J *Die Holzschwelle* Vol. 72 No. 85, 1977, pp 10-31, 13 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Studiengesellschaft fuer Holzschwellenoberbau EZ, Waldstasse 11, 5300 Bonn-Ippendorf, West Germany

#### 01 178444

##### AUTOMATION OF RAIL TRACK PROJECTS-REALIGNMENT OF CURVES [Automatizacão do projecto de vias ferreas. Rectificacão do tracado de curvas]

The first volume examines the problem of curve realignment and reviews the solutions adopted in various countries. The second develops a programme for dealing with a single curve. [Portuguese]

See also October 1977 volume.

National Laboratory of Civil Engineering, Portugal UIC Cat. 51 N3, Mar. 1977, 2 pp, 9 Fig., 1 Tab., 52 Ref., 2 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: National Laboratory of Civil Engineering, Portugal, Avenida do Brasil, Lisbon 5, Portugal

#### 01 178445

##### ACOUSTICAL METHOD OF ASSESSING THE QUALITY OF CONCRETE-SLEEPER PACKING [Akusticeskij metod opredelenija kacestva podbivki zelezobetonnyh spal]

No Abstract. [Russian]

Cigel'nyj, PM *Vestnik VNIIZT* No. 1, 1978, pp 52-53, 3 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

#### 01 178446

##### INFLUENCE OF TRACK-BEDDING ON THE DISTRIBUTION OF STRESSES IN THE TRACK [Vliyanie sloistosti sredy na raspredelenie naprjazenij v zemljanom polotne]

No Abstract. [Russian]

Margot'yev, AN *Vestnik VNIIZT* No. 1, 1978, pp 49-51, 4 Fig., 3 Tab., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

01 178453

**COPING WITH CURVE PROBLEMS**

The axle loadings of contemporary unit trains and the disparity between the speeds of such freights and high-speed passenger trains produce problems of wear, crushing, metal flow and corrugation of curve rail, along with gauge widening and overturning under extreme lateral forces. These effects are being countered with rail lubricators, surface grinding, hardened and fully heat-treated rail, larger tie plates and use of additional spikes on curves. The approaches of several individual railroads are described and an extended description of the Santa Fe's study of improved rail fasteners is included.

*Railway Age* Vol. 179 No. 11, June 1978, pp 31-33

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01 178531

**TRACK MAINTENANCE AT THE SNCF: INTRODUCTION**

The purpose of track maintenance is to keep the line in excellent condition approaching the optimum, and the work entailed results in heavy expenditure in the region of 5 thousand million francs per annum. There are many facets of maintenance because of the variety of fixed equipment and requirements, the age of installations, safety precautions, availability of money, etc. Maintenance can be preventive or curative but in all cases it involves a three-stage servicing cycle: preliminary inspection, carrying out the work and verification that it has been done correctly. Maintenance is a difficult and complicated operation that must be done by staff who have perfect knowledge of the procedures and the installations. [French]

Alias, J *Revue Generale des Chemins de Fer* Vol. 97 Jan. 1978, pp 1-6

ACKNOWLEDGMENT: British Railways

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01 178532

**TRACK MAINTENANCE**

The constant concern of the people responsible for track maintenance is to reduce the cost of the work whilst preserving or even improving the quality of the track. To reach this objective it is necessary to agree on a maintenance policy, improve track design, adapt maintenance standards and methods to requirements in the best way, and, finally, develop mechanisation. The author explains what is done on the SNCF in these different areas and where efforts should be directed in future. [French]

Cexus, M *Revue Generale des Chemins de Fer* Vol. 97 Jan. 1978, pp 7-15

ACKNOWLEDGMENT: British Railways

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DOTL JC

01 178548

**PREPARING THE BR SOUTH WALES MAIN LINE FOR 200 KM/H**

The cut-and-fill construction of British Railways South Wales line in the 1890s has given rise to unstable embankments and the geology of the area presented drainage problems. To prepare for operation of high speed trains, extensive rehabilitation was undertaken. This involved reballasting, some with bitumen spraying; substantial track lifts in some areas; repair or installation of drains; and raising or removal of overpasses to permit the raising of track. The procedures for this project are described.

Jones, RT (British Rail) *Railway Engineer* Vol. 3 No. 2, Mar. 1978, 6 pp, 3 Fig., 2 Phot.

ORDER FROM: ESL

DOTL JC

01 178907

**TESTS ON DURABILITY OF GROUTED BALLASTED TRACK**

The durability of grouted ballasted track has been investigated using a Vibrogir test apparatus. It is concluded that such treatment will be durable if it is carefully executed. Ballast depth and subgrade stability must be adequate. Elasticity of the grouted track can be produced with pads. Tests in actual track structures are advised.

Tanabe, K Mori, G Kobayashi, S Matsuzaki, H *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 11-14, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

01 178910

**A PROPOSAL OF NEW THEORY ON TRACK DETERIORATION**

Conventional track gradually deforms under the passage of trains. The degradation of ballast and the pressures exerted by ballast on the subgrade are major mechanisms for such deterioration. The relative roles of each needs to be determined in order to optimize track structures so they will resist settlement.

Sato, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 34-35, 2 Fig., 1 Ref.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

01 178911

**THE POSSIBILITY OF REUSING USED BALLAST**

Under traffic the Shinkansen track has experienced degradation of ballast and mud pumping of the subgrade. Tests have been made with ballast from seven segments of the Tokaido line to determine the portion of ballast which can be reused and to establish methods for controlling the sizes of such material.

Ohshima, H *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, p 36, 2 Fig.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

01 178912

**APPLICATION OF LIQUID ELASTOMERS TO SLAB TRACK**

In ballastless track the concrete slab to which rails are attached can displace on the loaded slab beneath due to deterioration of the concrete asphalt mortar which is used between them. The tests reported are on use of liquid elastomers and modified elastomers for packing as a replacement for the original CAM material.

Shimizu, K *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 37-38, 3 Fig.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

01 178951

**MUD PUMPING ON TRACKS--PRESENT STATE AND COUNTERMEASURES**

One survey done in 1975 has revealed that out of about 17,000 km of JNR lines, more than 700 km suffer from mud pumping. In those areas, the drainage after rainfall is poor, and the bearing capacity of the subgrade heavily declines with a progressive sinking of the track. This article presents some examples of mud pumping on these tracks as well as methods for improvement such as provision of center drainage, increase of ballast thickness, protection of subgrade surface with interposed layers and construction.

Machii, K (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 4, 1978, pp 20-21, 1 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

01 179061

**ASPECTS OF TRACK MAINTENANCE AND RENEWAL ON THE BELGIAN RAILWAYS**

The compact network of the Belgian National Railways has high traffic density which is a major consideration in the planning of track maintenance. Maintenance has been mechanized progressively, welded rail use is growing and maintenance standards are changing.

Gunst, G (Belgian National Railways) *Permanent Way Institution, Journal & Rpt of Proc* Vol. 96 Part 1, 1978, pp 52-62, 5 Fig.

ORDER FROM: Derry and Sons, Limited, Canal Street, Nottingham, England

DOTL JC

# 01 179118

## TRACK STRUCTURE DESIGN USING MATHEMATICAL MODELS

The objective of the report is to demonstrate the use of mathematical track structure models in the development of design charts. The models have been developed in Task 1, Mathematical Modelling, of the Track Structures Research Program, Contract DOT-FR-30038. The charts should enable the optimal selection of track components and to evaluate the structural performance of existing track components in a given loading environment. The criterion for acceptable track design is that the strength of the track structure on a fatigue basis not be exceeded and the Minor's rule is used. The charts are based on arbitrarily chosen wheel-rail load magnitudes. For vertical wheel-rail loading, the loading configuration consists of eight wheel loads and corresponds to that of two adjacent trucks of two coupled 100 ton (90,720 kg) cars. For lateral wheel-rail loading, a single lateral load applied to the base of one rail is used.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

So, W

Association of American Railroads Technical Center Final Rpt. FRA-/ORD-78/08, June 1978, 64 pp, Figs., 4 Ref.

Contract DOT-FR-30038

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-282357/AS, DOTL NTIS, DOTL RP

# 01 179132

## HIGH SPEED TRACK ON THE WESTERN REGION OF BRITISH RAILWAYS. PART 1

This paper describes the work which has been and is still being carried out to provide the necessary track standards for 125 mile/h running between London and the outskirts of Bristol. The very large number of items of work, including realignment, ballasting, treatment of the foundation, switch and crossing work, remodelling and elimination of level crossings, required the special provision of resources, and occupations of the line which in one case involved the closure of a route (the Badminton line) for 5 months continuously. Each type of work is dealt with, and selected items such as the major realignment at Twyford and the work on the Badminton line, are described in more detail.

Collins, RJ Black, J Tyrer, JE *Institution of Civil Engineers, Proceedings* Vol. 64 May 1978, pp 207-225, Refs.

ACKNOWLEDGMENT: Institution of Civil Engineers, Proceedings

ORDER FROM: ESL

DOTL JC

# 01 179136

## BENDING DEFORMATION OF RAIL AT RAIL JOINT

No Abstract.

Sugiyama, T Matsumura, H *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Dec. 1977, 174 pp, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

# 01 179140

## THE SINGOL RAIL JOINT [La junta Singol]

A description of a fish-plated rail joint without the expansion gap which allows the rail to contract and expand freely. The behaviour of the joint under operating conditions, and a technical and economic comparison with welded rail. [Spanish]

*AIT-Revista* No. 20, Feb. 1978, pp 33-38, 3 Tab., 13 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

# 01 179155

## RAIL GRINDING AS PART OF RAIL MAINTENANCE [Schleifen der Schienen als Bestandteil der Schienenpflege]

Rail corrugation and corrugation on the rail running surface cause premature wear on the track and more noise from train running. The author describes a rail grinding train which eliminates these defects and also repairs defective rail joints. A description is given of the results obtained and the measurements taken before and after the rail grinding train has passed. [German]

Jendrichowski, H *Eisenbahningenieur* Vol. 29 No. 3, 1978, pp 113-117, 7 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

# 01 179156

## TRACK LAID ON RIGID SLABS. THE DACHAU-KARLSFELD TEST LINE [Oberbau auf fester Fahrbahn. Versuchsstrecke Dachau-Karlsfeld]

The author briefly discusses tests carried out on slab track over the past few years and then describes the 1.7-km test section between Dachau and Karlsfeld where five different types of track are being tested. [German]

Oberweiler, G *Eisenbahningenieur* Vol. 29 No. 3, 1978, pp 119-121, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

# 01 179165

## A FORMATION OF BITUMINOUS CONGLOMERATE FOR THE NEW LINES: THE EXPERIENCE GAINED ON THE ROME-FLORENCE "DIRETTISSIMA"

Impermeability, resistance to frost and to fatigue and the property of self-repair form the most important characteristics which have favored the use of bituminous conglomerates, as an alternative to the ballast foundation of cemented aggregate, for the construction of the formation on the new Rome-Florence "Direttissima" of the Italian Railways. The thickness of the layer was determined by a method of calculation based on the dynamic characteristics of the material and checked by means of the tables for the dimensioning of flexible pavings, then verified in situ by means of tests, the most outstanding features of which are described in this article.

Cellard, B *Rail International* Vol. 9 No. 5, May 1978, pp 300-320, 16 Fig., 10 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

# 01 179262

## REFURBISHMENT OF RAILROAD CROSSTIES. A TECHNICAL AND ECONOMIC ANALYSIS

An analysis of the principal modes of failure for wooden railroad crossties was conducted and an evaluation of the technical and economic feasibility of refurbishing these ties was conducted. Among the principal modes of structural deterioration, only spike-killed tie repair was identified as practically feasible for in-situ treatment. However, once ties were removed from track, the feasibility of an in-plant repair of selected ties was found to be technically feasible for plate-cut and spike-killed ties. Such a repair operation could result in cost savings of 19-50% over the cost of new tie insertion, depending on the nature of the process selected and the assumed salvage value of a "spent" tie. Candidate process plant flow descriptions have been developed and the initial (capital) costs and annual operating costs evaluated. Recommendations for process evaluation are included as a starting point for continued investigations of crosstie reuse.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Loomis, AV Anyos, T

Stanford Research Institute Final Rpt. DOT-TSC-FRA-77-29, FRA-/ORD-77/76, Dec. 1977, 132 pp, Figs., Tabs., 5 App.

Contract RA 75-29

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-283447/AS, DOTL NTIS, DOTL RP

01 179268

**NONDESTRUCTIVE MEASUREMENT OF LONGITUDINAL  
RAIL STRESSES: APPLICATION OF THE ACOUSTOELASTIC  
EFFECT TO RAIL STRESS MEASUREMENT**

An ultrasonic probe has been designed, evaluated and shown capable of measuring longitudinal stress changes in railroad rails. The probe utilizes the effect of applied stress on wave velocity (acoustoelastic effect) to determine the stress change. Both laboratory and field evaluation has shown that the probe is capable of measuring stress changes with an accuracy of plus or minus 6.9 MN/Sq m (plus or minus 1 ksi).

Egle, DM Bray, DE

Oklahoma University Final Rpt. FRA/ORD-77/09.1, Jan. 1978, 113  
pp, Figs., Tabs., 27 Ref., 2 App.

Contract DOT-OS-40091

ACKNOWLEDGMENT: FRA

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PB-281164/AS, DOTL NTIS, DOTL RP

02 053254

**ADHESION OF LOCOMOTIVES FROM THE POINT OF VIEW OF THEIR CONSTRUCTION AND OPERATION. ADHESION TESTS OF SPRING 1975 WITH THE TEST MACHINE 18000 CONVERTED TO 16 2/3 HZ TRACTION**

The report is a continuation of reports 8, 9, 10 and 11 and it constitutes, together with these reports a documentation, accounting for all the measurements carried out with the test machine 18000. The report describes the measurements with the wheelset with 920 mm diameter wheels, driven by two coupled a.c. motors powered via a CFF locomotive from a 15 kV, 16 2/3 Hz contact system.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B44/RP 13, Apr. 1977, 52 pp, 1 Tab., 48 Phot.

ACKNOWLEDGMENT: UIC

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DOTL RP

02 053270

**DERAILMENT TESTS AT DERBY**

This report gives an account of the initial tests carried out in Derby in 1976, so as to outline the study of the derailment phenomenon caused by the climbing of the wheel on the rail and to obtain from this guidelines regarding the conditions to be realised and the parameters to be measured on behalf of the continuation of the studies.

Restrictions on the use of this document are contained in the explanatory material. This document was compiled by the ORE Specialists Committee for C 138.

International Union of Railways DT 63(C138), Oct. 1977, 14 pp, 37 Fig., 3 Tab.

ACKNOWLEDGMENT: UIC

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02 053274

**PERMISSIBLE MAXIMUM VALUES FOR THE Y-AND Q-FORCES AS WELL AS THE RATIO Y/Q. EFFECT OF THE SPACING OF CONSECUTIVE AXLES ON THE MAXIMUM PERMISSIBLE VALUE OF LATERAL LOAD FROM THE STANDPOINT OF TRACK DISPLACEMENT FIRST PART: TESTS WITH A TWO-AXLED WAGON**

The report covers the study programme and the results of the first stage of the tests carried out with a view to determining the effect of the distance between consecutive axles on the maximum permissible value of the lateral load applied by a wheelset from the point of view of the danger of track displacement. This first stage related to static tests at low speed (6-80 km/h) with a two-axled wagon with a large wheelbase, only one of whose wheelsets applies a lateral load to a track which has been deconsolidated as a result of a levelling operation. The results obtained with such a vehicle and track suggest a limit as defined in the report of about (10 plus P/3) kN, P being the axleload.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways C 138/RP 1, Oct. 1977, 25 pp, 27 Fig.

ACKNOWLEDGMENT: UIC

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02 093773

**TRAIN RESONANT CAR-BODY ROCKING DETECTOR SYSTEM**

A significant number of freight cars have a relatively high center of gravity and a truck center distance close to the 39-foot standard rail joint spacing. When operated near the resulting resonant speed of 18 to 20 mph on a curved track, such cars may derail. A hydraulic sensor is described in the patent application which detects and registers the resonant rocking motion of a train car and activates the brake system to stop the train prior to possible derailment due to wheel rock-off from the track.

Government-owned invention available for licensing. Copy of application available NTIS.

Swaim, FH

Department of the Navy Patent PAT-APPL-491 983, No Date, 15 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-D001258/3ST, DOTL NTIS

02 169011

**TRANSPORTATION ENVIRONMENT DATA BANK INDEX**

In an effort to determine the environment intensities to which energy materials in transit will be exposed, a "Data Bank" of environmental information has been established by Sandia Laboratories, Division 1285 for the ERDA Division of Environmental Control Technology. This document is an index which can be used to request data of interest. (ERA citation 02:050547)

Davidson, CA Foley, JT

Sandia Laboratories, Energy Research and Development Administration Apr. 1977, 46 pp

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

SAND-75-0248C

02 170946

**ON THE SUBJECT OF RAIL CORRUGATION [O volnoobraznom iznose rel'sov]**

The manifestation and development of the phenomenon of rail corrugation is explained with the aid of an analysis of the distribution of dynamic loads according to rail length. [Russian]

Vahnenko, VI Granovskij, AN *Vestnik VNIIZT* No. 6, 1977, pp 41-43, 2 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

02 172014

**THE INVESTIGATION OF DERAILMENTS**

The concept, history and operation of the Derailment Investigation Service maintained by the R&D Division of B.R. is discussed, together with the nature and sources of the body of technical and numerical data which has been established. The mechanisms and causes of derailment are also described and the relevance of vehicle condition, track geometry, operating circumstances, and vehicle dynamics discussed.

Duncan, IG *Institution of Technical Engineers, Proceedings* Vol. 191 No. 37, 1977, pp 323-332, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Institution of Technical Engineers, London, England

02 172603

**THE "CREEP" OF LOCOMOTIVE DRIVING WHEELS (PART I)**

The work of various authorities on the experimental and calculated values of tractive creep related to locomotive wheels and railway rails is briefly reviewed. The basic problem discussed is that of a wheel supporting a vertical load rolling on a rail and exerting some value of tractive force to the rail. The contact area between the wheel and the rail was assumed to be of rectangular geometry. The problem is treated as one of plain strain, and the equations of equilibrium in terms of dilation and rotation are given. Further mathematical treatment is given for derivation of expressions for traction, contact stresses, displacement, contact area, the value of surface strain over the locked area, and finally the expression for tractive creep. Diagrams are provided to describe the area of wheel contact and values of tractive force and strain.

Andrews, HI *Rail Engineering International* Vol. 5 No. 1, Jan. 1975, pp 8-10, 2 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: ESL

DOTL JC

02 172643

**PRELIMINARY EVALUATION OF RAIL VEHICLES BY COMPUTER SIMULATION**

Mathematical models of rail vehicles and track structures developed over the past decade have proven to be invaluable tools in rail transportation research. One important use of these mathematical models is to provide a



preliminary evaluation of new rail vehicle and track structure designs, prior to extensive prototype construction and testing.

Ahlbeck, DR (Battelle Columbus Laboratories) *High Speed Ground Transportation Journal* Vol. 11 No. 3, Sept. 1977, pp 281-296, 9 Ref.

ORDER FROM: ESL

DOTL JC

02 172645

## NATURAL FREQUENCY OF RAIL TRACK AND ITS RELATIONSHIP TO RAIL CORRUGATION

Response of a rail track due to a moving load; natural frequencies and rail corrugation.

Mair, RI *Institution of Engineers (Australia) Civ Eng Trans* Vol. CE19 No. 1, 1977, pp 6-11, Refs.

ORDER FROM: ESL

DOTL JC

02 172648

## ADHESION OSCILLATIONS OF AN ELECTRIC MOTIVE POWER UNIT AT THE ADHESION LIMIT [Reibschwingungen eines elektrischen Triebfahrzeuges an der Haftwertgrenze]

The paper discusses the slip characteristics of a heavily loaded electric locomotive as experienced after a drop of the coefficient of adhesion on one side. Using a simple wheel/coupling/motor model in order to show the physical mechanism of the self-excited oscillations, the influences due to the finite stiffness of the axle and to the inductance in the main circuit are reviewed. Finally, the behaviour of one representative axle each in the front and rear bogies is described by numerical integration under due consideration of all final control elements in the main and external field circuits. The results, particularly the torsional torques in the axles, are compared with the test results obtained by the railway administration. Alternative solutions for clarifying any inconsistencies are hinted at. The drive with rubber springs has proved to be a suitable means to maintain the torsional oscillations of the axle within safety limits. [German]

Koerner, E (Technical University of Graz, Austria) *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 348-355, 4 Ref.

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

02 172651

## A NEW METHOD TO DETECT THE DYNAMIC TRACK PLAY QUANTITIES ON RAIL VEHICLES (WHEEL POSITION MEASUREMENTS) [Eine neue Methode zur Erfassung der dynamischen spurspielmessgrößen an Schienenfahrzeugen (Radstellungsmessung)]

The method of measurement operates on the principle of representing the planes of reflection and reduces the task of detecting dynamic track play quantities to individual, independent photo-electronic displacement measurements. The measuring system uses infrared radiation and photo-detectors. The test results are fed to the recording equipment through the evaluating electronics. Initial tests under extreme weather conditions have meanwhile been successfully conducted on lines of Rhatische Bahn and Swiss Federal Railways. [German]

Jenzer, R *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 391-394

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

02 172653

## THE AACHEN TESTING BENCH FOR RUNNING QUALITIES: DEVELOPMENT AND FIRST TEST RESULTS [Der Aachener Rollpruefstand: Entwicklung und erste Ergebnisse]

The chassis dynamometer at the Institute for mechanical handling and rail vehicles of Aachen Technical University is briefly described. Zigzag motion of rail vehicles may involve characteristic number problem or is excited by interference pulses due to the track. Unstable running of a Minden-Deutz bogie on the testing bench for running qualities was excited at a speed above 200 km/h. The development and the rapid decay--although at a considerably lower speed--are shown as a function of the lateral wheelset motions vs. the speed. [German]

Nothen, J *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 324-327

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

02 172654

## THE DYNAMIC BEHAVIOUR OF BOGIE VEHICLES ON ROLLER END PLATES [Das dynamische Verhalten von Drehgestellfahrzeugen auf Rollscheiben]

The paper reports on fundamental theoretical studies to back up experimental investigations on the limit of stability. The studies were conducted on a six-axle articulated rapid transit train, the running properties of which were measured. The model statements are investigated for testing bench for running qualities with two, four and six axles with new and worn roller end plate profiles. The influence of wear on the adhesion function, which cannot yet be quantified, was considered in the calculation by assuming a reduction of its initial trend. With this model statement, a two-axle roller testing bench is sufficient for determining the limit of stability if the influence of the shape of the wheel profile is determined with new and worn roller end plates. [German]

Krettek, O *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 328-338, 29 Ref.

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

02 172655

## SIMULATION OF TRACK FORCES AND RUNNING CHARACTERISTICS OF RAIL VEHICLES [Simulation von Spurkraeften und Laufeigenschaften fuer Schienenfahrzeuge]

ASEA's railway division has developed a computer program for simulating the interactions of the rail vehicle and the track. This program makes it possible to compute the forces between the vehicle and the track as well as the lateral movements and accelerations of the vehicle while running on a track with position irregularities both on level tangent sections and through curves. The program for a four-axle vehicle with two bogies covers 37 degrees of freedom and accounts for the nonlinearities in the wheel flange contact, in adhesion and in certain elastic and damping components. The computed results are compared with the test results of a Type X15 experimental train with two types of bogies as obtained at speed up to 220 km/h. If the input data are correct, the accuracy in computation is estimated at about plus or minus 10%. [German]

Andersson, E *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 339-347

ACKNOWLEDGMENT: British Railways

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DOTL JC

02 172656

## PLANNING CONSTRUCTION AND OPERATION OF A TESTING BENCH FOR RUNNING QUALITIES FOR THE WHEEL/RAIL RESEARCH PROGRAM [Planung, Bau und Betrieb des Rollpruefstandes fuer das Rad/Schiene-Forschungsprogramm]

The chassis dynamometer serves to investigate the running properties of running gear and vehicles as well as influences resulting from individual components. The test facility is to provide information for basic research on vehicle running properties, basic research on track system construction, and development of new vehicle components or vehicles. In order to provide test results for the most direct use, the track system properties (track elasticity, wheel to rail contact conditions, route elements) must be optimally simulated. To do this, a computer transmits periodic and random signals to the rollers replacing the rails. [German]

Althammer, K *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 312-323, 27 Ref.

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

02 172661

**NEW CRITERIA FOR ESTABLISHING TRACK DIMENSIONS**

[Nuevos criterios en el dimensionamiento de vías ferreas]

The author examines existing criteria and methods for establishing track dimensions and then develops a new method based on better knowledge of the pressure-deformation relationship with the ballast system and track formation under the effect of rolling stock. [Spanish]

Lopez Pita, A *Revista de Obras Publicas* No. 3147, July 1977, pp 571-580, 7 Fig., 4 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Escuela de Ingenieros de Caminos, Ciudad Universitaria, Madrid 3, Spain

02 172931

**BASIC STUDY ON IMPROVEMENT OF ADHESION OF WHEEL-RAIL INTERFACE USING PLASMA EMISSION**

Studies were initiated around 1970 to investigate increasing the adhesion coefficient and securing its stability by plasma radiation (radiation of electrically charged particles). Studies which were previously conducted investigated the macroscopic effects of plasma radiation and did not cover such areas as the effects of plasma radiation in relation to differences in the surface conditions of the rails, and the changes and characteristics of the adhesion effect that occur with the passage of time. The present work focuses on a basic study of the adhesion effect achieved through plasma radiation applied to different kinds of rail surface conditions and examines the adhesion mechanism and other factors that develop after plasma radiation. [Japanese]

Iwamoto, M Tomizawa, M Deguchi, S *Journal of Railway Engineering Research* Vol. 32 No. 4, 1975, pp 128-131, 8 Fig., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Ken-yusha, Hiraricho 1-45-6, Kokubunji, Tokyo, Japan

02 173054

**TRIBOLOGY OF WHEEL ON RAIL**

The functioning of wheels and rails as a supporting and guiding system depends on a Hertzian contact of 0.2 in/in area. In addition to its supporting function, this area must withstand tangential forces to enable the functions of traction, braking, and guidance to be fulfilled. Such traction forces are accompanied by a deflection known as "creep" and classical estimates of this quantity are compared with measurements made on the track. Modes of wear of wheel and rail are described and alternative systems which avoid contact are discussed.

Barwell, FT (Swansea University College, Wales) *Tribology International* Vol. 7 No. 4, Aug. 1974, pp 146-150, 5 Fig., 12 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: IPC Business Limited, 205 East 42nd Street, New York, New York, 10017

02 173151

**WHEELSET LATERAL DYNAMIC ANALYSIS USING THE DESCRIBING FUNCTION TECHNIQUE**

This paper deals with the analysis and dynamic modeling of railway wheelsets moving on straight regular tracks. The describing function method of analysis is applied to investigate the influence of parametric variations on wheelset critical velocity. In addition, the relationship between the amplitude of sustained lateral oscillations and critical speed is derived. The nonlinearities in the model include the difference in rolling radii as a function of lateral displacement of the wheelset from its mean position, profile conicity, and gravitational stiffness in the lateral and yaw directions. Quantities such as critical speed, frequency of limit cycles, gravitational stiffness, effective conicity, and creepage can be easily computed using the proposed technique.

Paper for Meeting, September 26-30, 1977.

Garg, DP (Duke University)

American Society of Mechanical Engineers N-77-DET-149, 1977, 11 pp, 37 Ref.

ACKNOWLEDGMENT: EI

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02 173159

**METHOD FOR MEASURING SURFACE TEMPERATURE BETWEEN ROLLING/SLIDING STEEL CYLINDERS**

A special bisignal transducer has been developed which allows pressure and temperature measurements to be made (essentially) simultaneously. With this technique, it is possible to locate the contact zone temperature relative to pressure and evaluate the relationship between heat generation and pressure. Temperature and pressure data obtained using a synthetic mineral oil as the lubricant have been obtained for rolling and rolling-sliding contact in a disk apparatus. The temperature rise through the contact zone has been shown to be on the order of 20-40 C.

Paper for Meeting, October 3-5, 1977.

Kannel, JW (Battelle Columbus Laboratories); Zugaro, FF Dow, TA

American Society of Mechanical Engineers n 77-Lub-1, 1977, 5 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

02 173160

**FACTORS LEADING TO RAILWAY DERAILMENTS**

The paper discusses some of the mechanical characteristics of trains, train driving and the track, with emphasis on New Zealand conditions. Definitions of terminology used to describe rail vehicle motion precede a consideration of the interaction between the vehicle and track. The causes of main-line derailments are described in some depth and followed by some statistics on derailments in New Zealand and comparison with overseas.

McCarten, RJ *New Zealand Engineering* Vol. 32 No. 8, Aug. 1977, pp 174-177, 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

02 173424

**MATHEMATICAL STUDY OF OSCILLATION BEHAVIOUR OF RAIL VEHICLES IN THE VERTICAL DIRECTION [Rechnerische Untersuchung des Schwingungsverhaltens von Schienenfahrzeugen in senkrechter Richtung]**

Taking a rail vehicle intended for running at 400 km/h, a study has been carried out on the effects of dimensions, weight distribution, stiffness and suspension-damping coefficients, so as to reduce body acceleration and dynamic axle overloading to a minimum. [German]

Bergander, B *Archiv fuer Eisenbahntechnik* No. 32, 1977, pp 46-52, 1 Tab., 5 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

02 173435

**RAIL SPEEDS OF 500 KM/H IN THE LABORATORY [Im Labor fahrt die Bahn mit Tempo 500]**

A testing system has been set up in the Munich repair workshop for conducting experiments on the limits of the wheel-rail technique. Tests carried out with the latest equipment have resulted in speeds of up to 500 km/h. There are plans for expanding the testing system to include experiments with a complete vehicle at very high speeds. [German]

Krummheuer, E *Handelsblatt* Vol. 32 No. 213, 1977, 36 pp, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Handelsblatt GmbH, Postfach 1102, D-4000 Dusseldorf 1, West Germany

02 173438

**EXPERIMENTAL STUDIES OF THE AERODYNAMICS OF TRAINS RUNNING AT HIGH SPEEDS [Etudes experimentales sur l'aerodynamique des trains circulant a grande vitesse]**

This account, written on the occasion of the 14th Congress on Applied Aerodynamics held in Toulouse on the 7th, 8th and 9th November 1977 by the Aeronautical and Space Association of France, describes experiments carried out with the aim of solving aerodynamic problems arising from the running of high-speed trains. The experiments concerned running of a single train, passing of 2 trains, the wind effect in the environment and running of trains in tunnels. [French]

Marty, P

Centre National de la Recherche Scientifique SNCF Cat. 40 N73, 1977, 30 pp, 13 Phot., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Centre National de la Recherche Scientifique, Laboratoire d'informatique pour mecan et sci de l'ingenieur, Paris 7e, France

## 02 173580

### INTEGRATION OF REAL SUSPENSION ELEMENTS IN AN ANALOGUE SIMULATION OF VERTICAL VEHICLE VIBRATIONS

A simulation system for vertical vehicle vibrations is proposed and investigated, in which a real suspension element is integrated in the electrical analogue mode. By leaving the scope of total electrical simulation the difficulties of programming complex elements are avoided. The method and the application of the simulation system is explained for the example of a two mass model, in which the electrical simulation of the damping is replaced by a real shock absorber. After the integration of this element the effect of changing oil temperature on the vibration properties of the model is shown.

Lemke, M (Berlin Technische Universitaet); Voy, C Garavy, K *Society of Environmental Engineers, Journal* Vol. 16 No. 3, Sept. 1977, pp 21-26, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 02 173605

### THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS

No Abstract.

Published for the International Union of Theoretical and Applied Mechanics.

Slibar, A Springer, H  
Swets and Zeitlinger B.V. 1978, 530 pp

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Swets and Zeitlinger B.V., Heereweg 347B, Lisse, Netherlands

## 02 173610

### INCREASING VELOCITIES IN MAIN AND TRANSITION CURVES

For velocities to be increased in main and transition curves during constructional charges, one solution applies major admissible values of "comfort" criteria, such as unbalanced lateral acceleration and lifting speed. Formulas are given for determining possible increases of velocity of up to 20 km.p.h. as depending on the radius and initial superelevation. [German]

Hartleben, D *DET Eisenbahntechnik* Vol. 25 No. 12, Dec. 1977, pp 505-507

ACKNOWLEDGMENT: British Railways  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

## 02 173778

### A SIMPLE DYNAMIC MODEL FOR SIMULATING DRAFT-GEAR BEHAVIOR IN RAIL-CAR IMPACTS

A new, simple dynamic model is developed for use in simulating draft-gear behavior in rail-car impacts. The model is based on an analysis of the individual components inside several types of draft gears. The transition from kinetic to static friction during the impact is included. Comparisons with drop-hammer tests and full-scale impacts show good agreement with the experimental forces and deflection. In particular two very important phenomena are correctly simulated: 1) the rise in force just before maximum travel, and 2) the stick-slip-grab phenomenon during impact.

Contributed by the Rail Transportation Division of ASME for presentation at the Rail Transportation Conference, St. Paul, Minnesota, April 11-12, 1978.

Hsu, T-K Peters, DA (Washington University, St Louis)  
American Society of Mechanical Engineers Conf Paper 78-RT-2, 1978, 5 pp, 7 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

## 02 173783

### LATERAL STABILITY OF FREIGHT CARS WITH AXLES HAVING DIFFERENT WHEEL PROFILES AND ASYMMETRIC LOADING

The majority of studies of rail vehicle lateral dynamic response have utilized models wherein it is assumed that the loading and geometry of the vehicles are symmetrical left and right and fore and aft. It has been observed that with use North American rail freight vehicles develop transverse wheel profiles that may be different for wheels on a given axle and that may also differ from axle to axle on a given vehicle. As the transverse wheel profiles exert a strong influence on lateral dynamic response by affecting the effective conicity and gravitational stiffness of the wheelset, models capable of having different wheel profiles on the same axle as well as on different axles were developed to investigate the stability behavior. Additionally, these models were formulated so that the effects on stability of asymmetric fore and aft loading conditions, as manifested through gravitational stiffness effects and creep coefficients, could be examined. Results of studies using these models are presented that display characteristics markedly different from those of completely symmetric models. A particularly interesting result is that, in most cases, the lateral stability of vehicles with different wheel profiles on the various axles is strongly sensitive to the direction of motion with results for each direction of motion which may differ radically from symmetric cases.

Contributed by Rail Transportation Division of ASME for presentation at the Rail Transportation Conference, St. Paul, Minnesota, April 11-13, 1978.

Tuten, JM (Battelle Memorial Institute); Law, EH (Clemson University); Cooperrider, NK (Arizona State University, Tempe)  
American Society of Mechanical Engineers Conf Paper 78-RT-3, 1978, 16 pp, 16 Fig., 2 Tab., 20 Ref., 1 App.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

## 02 173784

### HUNTING STABILITY OF THE THREE AXLE LOCOMOTIVE TRUCK

The hunting stability of the 3-axle locomotive truck is evaluated, using a linear eleven degree of freedom model. Predictions from the model are validated with test data, and the effects of key parameters--wheel profile, primary suspension stiffness, and secondary suspension damping--on hunting stability are shown.

Contributed by Rail Transportation Division of ASME for presentation at the Rail Transportation Conference, St. Paul, Minnesota, April 11-13, 1978.

Rinehart, RE (General Electric Company)  
American Society of Mechanical Engineers Conf Paper 78-RT-6, 1978, 9 pp, 13 Fig., 5 Tab., 8 Ref.

ACKNOWLEDGMENT: ASME  
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DOTL RP

## 02 173798

### PERMISSIBLE VALUES OF NON-COMPENSATED ACCELERATIONS AND THEIR TIME INCREMENTS ON HIGH-SPEED RAILWAY SECTIONS

Comfort in conditions of high-speed surface travelling is a problem which requires the attention of specialists and designers of both rolling stock and permanent way. Very detailed investigations are at present in progress. The measurement of transverse accelerations and in particular the non-compensated accelerations are useful in order to assess the running performance of a vehicle and such vital factors as safety and comfort. This article discusses some aspects of the problem in connection with investigations performed on USSR Railways.

Yershkov, OP Lvov, AA Kartzev, VY (All-Union Railway Research Institute, USSR) *Rail International* Vol. 9 No. 1, Jan. 1978, pp 10-18, 6 Fig., 4 Tab., 13 Ref.

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DOTL JC

02 174040

**TRACK MAINTENANCE/RAILCAR SUSPENSION TRADE-OFFS TO OBTAIN ACCEPTABLE RIDE QUALITY**

A methodology for combining vehicle suspension design with track maintenance requirements to provide an acceptable level of ride quality is presented. The emphasis is on minimizing the combined vehicle/track costs to maintain a specified ride quality. A general methodology is formulated that uses dynamic railcar computer models, models that relate maintenance/construction tolerances to track irregularity descriptions, available cost data that identify the cost of maintaining specified maintenance/construction tolerances, and ride quality specifications that relate the railcar vibration environment to passenger comfort. The methodology is illustrated by an example that analyzes the lateral dynamic response of a conventional passenger car to rail alignment irregularities.

Passenger Vib in Transp Veh, presented at Des Eng Tech Conf, Chicago, Ill, September 26-28, 1977.

Sayers, MW (Massachusetts Institute of Technology); Hedrick, JK  
American Society of Mechanical Engineers Vol. 24 1977, pp 35-38, 20 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

02 174383

**MATHEMATICAL REPRESENTATION OF PROBLEMS RELATED TO THE RUNNING DYNAMICS FOR THE EXAMPLE OF A BO'BO' LOCOMOTIVE [Mathematische Behandlung von Problemen der Laufdynamik, Dargestellt am Beispiel einer Bo'Bo'-Lokomotive]**

The simulation of the running dynamics of a locomotive on a digital computer provides useful information on the static and dynamic conditions. In addition, it permits a better assessment of the practicability of new developments. The problems are analysed using the iteration method according to Newton. The derivatives to be computed in this connection are obtained by machine differentiation. The realization of the procedure is described. [German]

Ostertag, E *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 395-403

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

02 174543

**SIMULATION OF THE MECHANICAL BEHAVIOR OF A SPENT FUEL SHIPPING CASK IN A RAIL ACCIDENT ENVIRONMENT**

A preliminary mathematical model has been developed to simulate the dynamic mechanical response of a large spent fuel shipping cask to the impact experienced in a hypothetical rail accident. The report was written to record the status of the development of the mechanical response model and to supplement an earlier report on spent fuel shipping cask accident evaluation. (ERA citation 02:060628)

Fields, SR  
Hanford Engineering Development Laboratory, Energy Research and Development Administration Feb. 1977, 101 pp

Contract EY-76-C-14-2170

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

HEDL-TME-76-18

02 175299

**A TWO-DIMENSIONAL METHOD FOR CALCULATING UNSTEADY PRESSURE DISTRIBUTIONS ON RAILROAD TRAINS [Ein Zweidimensionales Verfahren zur Berechnung Instationärer Druckverteilungen an Eisenbahnzügen]**

A method is discussed for calculating unsteady aerodynamic phenomena occurring upon the encounter of high speed railroad trains and on their entering a tunnel; it is based upon two-dimensional potential flow. A singularity method is used for calculation of the potential as a function of time and the contour velocity, incorporating source distributions on body contours (trains, tunnel walls). Tail contours are open to approximate effects of wake flow. The coefficient of the unsteady static pressure is formed by accounting for the potential variation in time. Longitudinal and lateral forces, as well as the moment, result from the integration of the pressure distribution. A FORTRAN program is described. [German]

36

Steinheuer, J

Deutsche Forschungs- u Versuchsanst f Luft- u Raumft DLR-IB-151-77/8, May 1977, 92 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N78-14007/6ST

02 175504

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION, VOLUME I. EXECUTIVE SUMMARY**

The report reviews and gives conclusions of Phase I of the Truck Design Optimization Project (TDOP). It represents the first of a six volume published set. The report studies the performance of the standard three-piece truck. Railroad profitability can be increased through the objective of reduction of lading damage. A combination of longitudinal forces (humping and train action), lateral oscillations (hunting), and vertical dynamics (rock n' roll) is one cause of lading damage which can be eliminated by the railroad industry's adoption of performance guidelines which define performance values to control truck and carbody motion. Another profitability objective is to reduce the costs of wear and maintenance on rail vehicle components. Wheel flange and tread wear represent one of the major costs to operating railroads and car leasers, and can be attributed to poor truck performance and adverse wheel/rail interface dynamics. The thirty percent of car repair costs associated with wheels can be substantially reduced through improved truck performance. Both of these objectives must be backed by the development of a sound economic methodology useful in the equipment acquisition process and the attendant alternative investment decisions.

See also PB-248350. Volumes 2 through 6 in RRIS 02 175505-177509 respectively; Bulletin 7802.

Fay, GR Bang, AJ  
Federal Railroad Administration Final Rpt. FRA/ORD-78/12.I, Feb. 1978, 39 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278698/6ST

02 175505

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION, VOLUME II. PHASE I, FINAL REPORT**

Tasks assigned to Phase I of the Truck Design Optimization Project (TDOP) are concluded. This report includes lists of data tapes, reports filed through FRA with the National Technical Information Service (NTIS). Also, in the appendices of this report will be found seven additional small technical reports, as well as drawing lists, definitions and a bibliography.

See also Volume 1 and Volumes 3 through 6 in RRIS 02 175504 and 175506-175509 respectively; Bulletin 7802.

Southern Pacific Transportation Company, Federal Railroad Administration FRA/ORD-78/12.II, TDOP-76-227, Feb. 1978, 285 pp

Contract DOT-FR-40023

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278699/4ST

02 175506

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION PROJECT. VOLUME III. PHASE I. FREQUENCY DOMAIN MODEL**

The frequency domain model computer program developed by the Truck Design Optimization Project (TDOP) simulates the operation of an idealized railroad freight car riding on standard three piece trucks. Given user specified data describing the characteristics and operating conditions of the vehicle, the program utilizes track deflection data prestored on random access disk to generate driving functions for the model. These track deflection data are broken down into frequency components before being used to activate the simulated vehicle. Similarly, the results of program execution are vehicular responses as functions of frequency. The large execution times associated with time domain models are avoided, but the price for this saving is the restriction of the simulations to those idealized conditions that are solvable by linear simultaneous complex equations.

See also Volumes 1 through 2 and 4 through 6 in RRIS 02 175504-175505 and 175507-175509 respectively; Bulletin 7802.

Southern Pacific Transportation Company, Federal Railroad Administration Final Rpt. FRA/ORD-78/12.III, TDOP-76-126, Feb. 1978, 404 pp  
Contract DOT-FR-40023

ACKNOWLEDGMENT: NTIS, FRA  
ORDER FROM: NTIS

PB-278700/0ST, DOTL NTIS, DOTL RP

02 175507

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION. VOLUME IV. CRITIQUE OF FREQUENCY DOMAIN MODEL-SOLUTION TECHNIQUES**

The Truck Design Optimization Program (TDOP), Phase I, Frequency Domain Model (FDM) is reviewed. The review of this railcar structural dynamics program is divided into three areas: (1) solution method, (2) power spectral density, and (3) integrity of the excitation function.

See also Volumes 1 through 3 and 5 through 6 in RRIS 02 175504-175506 and 175508-175509 respectively; Bulletin 7802.

Sussman, NE

Mitre Corporation, Federal Railroad Administration FRA/ORD-78/12.IV, WP-12656, Feb. 1978, 46 pp

Contract DOT-FR-54090

ACKNOWLEDGMENT: NTIS, FRA  
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PB-278701/AS, DOTL NTIS, DOTL RP

02 175508

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION. VOLUME V. CRITIQUE OF FREQUENCY DOMAIN MODEL-EQUATIONS OF MOTION**

As part of the Truck Design Optimization Project (TDOP) a mathematical model was developed to be used for predicting truck behavior. The model, its description, the nomenclature used, and the development of the equations of motion were all oriented toward the computer program which would ultimately solve the equations. A detailed review and evaluation of the mathematical model was carried out. This review was judged necessary to provide an independent evaluation of the model which contained many assumptions and some errors whose effect was not clear.

See also Volumes 1 through 4 and 6 in RRIS 02 175504-175507 and 175509 respectively; Bulletin 7802.

Muhlenberg, JD

Mitre Corporation, Federal Railroad Administration FRA/ORD-78/12.V, WP-11978, Feb. 1978, 58 pp

Contract DOT-FR-54090

ACKNOWLEDGMENT: NTIS, FRA  
ORDER FROM: NTIS

PB-278702/6ST, DOTL NTIS, DOTL RP

02 175509

**FREIGHT CAR TRUCK DESIGN OPTIMIZATION. VOLUME VI. CRITIQUE OF PHASE I. TEST SERIES RESULTS REPORTS**

The major output resulting from the Phase I effort which is of interest to railroads, suppliers, and the Phase II contractor was the series of Test Results Reports, which contained summary commentary and selected processed data from the field testing. Because of the importance of the content of these collections of data and the quantity of data involved, these reports are addressed in considerable detail in this report.

See also Volumes 1 through 5 in RRIS 02 175504-175508 respectively; Bulletin 7802.

Muhlenberg, JD

Mitre Corporation, Federal Railroad Administration Tech Rpt. FRA-/ORD-78/12.VI, Feb. 1978, 30 pp

Contract DOT-FR-54090

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278703/4ST

02 176018

**ANALOG AND DIGITAL COMPUTER SIMULATION OF COULOMB FRICTION**

Coulomb friction, such as found in the suspension system of railway freight cars, can strongly influence dynamic behavior. The Coulomb friction nonlinearity must be accurately implemented in computer simulations of multi-degree-of-freedom dynamic models. This report proposes three computer models for friction and analyzes their performance in analog and

digital computer simulations. Simulation techniques used are described in detail. Performance of each friction model is compared to analytical results. The accuracy, advantages, and disadvantages of each model are discussed. The report concludes with recommendations on the use of the proposed friction models.

Heller, R Tuten, JM Kadala, PS Law, EH

Clemson University, Federal Railroad Administration Intrm Rpt. FRA/ORD-78/07, Dec. 1977, 61 pp

Contract DOT-OS-40018

ACKNOWLEDGMENT: NTIS  
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PB-279465/9ST, DOTL NTIS

02 176025

**USERS' MANUAL FOR KALKER'S SIMPLIFIED NONLINEAR CREEP THEORY**

The conversion of the computer program, 'Simplified Theory of Rolling Contact,' (used for calculation of a nonlinear creep force-creepage relationship) from the original Algol language to Fortran is considered. The Algol program was written by Professor J. J. Kalker and was derived from the paper, 'Simplified Theory of Rolling Contact,' Delft Progr. Rep., Series C: Mechanical and Aeronautical Engineering and Shipbuilding, 1 (1973), pp. 1-10. A significant number of changes was made in the program for more convenient use; however, the fundamental equations remain unchanged. The results were checked in detail to insure agreement with the original solution. The program gives an appropriate solution for the resultant tangential creep forces and spin moment acting between two bodies of equal linearly elastic material properties. The creep forces and spin moment are due to lateral, longitudinal, and spin creepages. Assumptions corresponding to the Hertz contact theory are implied and two additional simplifying assumptions are made, resulting in a significant reduction in computation time as contrasted with previous solutions. Two separate computer codes were developed, the first being the general solution with extended input and output, and the second a shortened version primarily intended for use as a subroutine. Surprisingly good agreement is found to exist between the 'Simplified Theory' and published experimental results for a wide range of contact ellipse eccentricity.

Prepared in cooperation with Arizona State Univ., Tempe. Dept. of Mechanical Engineering and Association of American Railroads, Chicago, Ill.

Goree, JG Law, EH

Clemson University, Arizona State University, Tempe, Association of American Railroads Technical Center, Federal Railroad Administration FRA/ORD-78/06, Dec. 1977, 58 pp

Contract DOT-OS-40018

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279503/7ST, DOTL NTIS

02 176677

**COLLISIONS BETWEEN WAGONS**

The purpose of the study is to examine the phenomena which occur in a marshalling yard when one or more wagons collide at low speed, less than 20 km/h, with one or more stationary wagons. Various cases are examined on the basis of general equations. In the first instance, the effect of the numbers of wagons stationary and run forward is brought out.

Raeber, V *Rail International* Vol. 9 No. 2, Feb. 1978, pp 104-131, 23 Fig., 14 Tab., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

02 176679

**STABILITY OF MOVEMENT IN A STRAIGHT LINE OF A TWO-AXLE BOGIE. SELF-EXCITATION VIBRATIONS AT SPEEDS ABOVE A CRITICAL THRESHOLD [Stabilność ruchu prostoliniowego wozka dwuosiowego. Drgania samowzbudne przy prędkościach nadkrytycznych]**

The author points out that in cases of high speeds there is a considerable drop in the running stability of two-axle trucks. The range in which self-excitation vibrations occur also drops and the loss in stability when

running in a straight line for any reason whatsoever can, therefore, be dangerous. [Polish]

Piotrowski, J *Pojazdy Szynowe* No. 2, 1977, pp 27-33, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: *Pojazdy Szynowe*, Warsaw, Poland

## 02 176684

### SYMPOSIUM ON RAILWAY DYNAMICS [Simposio sobre dinamica ferroviaria]

The Asociacion de Investigacion del Transporte (AIT) has just published a compendium of the lectures given at the symposium on railway dynamics. It is in three parts: Vehicle dynamics; contribution to the study of railway dynamics; track dynamics. The high technical level of the lectures means that this document gives a broad view of all the problems that arise in the various aspects of railway dynamics, and the way in which the principal railways are dealing with such problems. [Spanish]

In 3 volumes.

*AIT-Revista* UIC Cat 40 N46, May 1977, 3 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

## 02 176693

### DETERMINING THE BEHAVIOUR OF RAIL VEHICLES WHEN RUNNING BY CALCULATING THE TRANSVERSE VIBRATIONS OF A LINEAR MODEL [Erfassung des Laufverhaltens von Schienenfahrzeugen durch die Berechnung der Querschwingungen eines linearisierten Modells]

At the Technical University of Berlin, a program has been developed for determining the vibratory behaviour of rail vehicles at maximum speeds, using linear differential equations. The results of the calculations were confirmed by running vehicles on the Hamburger Hochbahn AG's test track. The behaviour of the vehicles can be represented by the free vibrations of a linear model. Coefficients were applied to adapt this to a real system. [German]

Knothe, K *Leichtbau der Verkehrsfahrzeuge* Vol. 21 No. 6, 1977, pp 109-118, 4 Tab., 15 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

## 02 176695

### ANALYSIS OF THE CHANGES IN COACH SUSPENSION PARAMETERS DURING OPERATING AS THE STARTING POINT FOR RESEARCH INTO THE DYNAMIC PROPERTIES OF VEHICLES [Analiza zmian parametrow zawieszenia wagonu osobowego zachodzacych podczas eksploatacji jako punkt wyjscia badania wlasnosci dynamicznych pojazdow]

Study into the influence of underframe suspension parameters on rail vehicle dynamics have shown that changes in structural parameters have a particular effect on vehicle behaviour during running. [Polish]

Jakubowski, T Nowicki, J *Pojazdy Szynowe* No. 3, 1977, pp 3-9, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: *Pojazdy Szynowe*, Warsaw, Poland

## 02 176699

### COMPARATIVE VIBRATION ENVIRONMENTS OF TRANSPORTATION VEHICLES

Measured vibration data are presented for a number of air and surface vehicles. Consideration is given to the importance of direction effects; of vehicle operating modes such as takeoff, cruise, and landing; and of measurement location on the level and frequency of the measurements. Various physical measurement units or descriptors are used to quantify and compare the data. Results suggest the range of vibration associated with a particular mode of transportation and illustrate the comparative levels in terms of each of the descriptors. Collectively, the results form a data base which may be useful in assessing the ride of existing or future systems relative to vehicles in current operation. In addition, subjective response data obtained from vibration simulator studies are presented to illustrate human response characteristics as well as to indicate a laboratory approach for the development of ride-quality criteria.

ASME AMD, Passenger Vib in Transp Veh, presented at DesEng Techn

Conf, Chicago, Ill, September 26-28, 1977.

Stephens, DG

American Society of Mechanical Engineers Vol. 24 1977, pp 59-72, 17 Ref.

ACKNOWLEDGMENT: EI

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## 02 176711

### INFLUENCE OF THE GEOMETRICAL DEFORMATION OF THE SECONDARY SUSPENSION GEAR OF BOGIES AND COACHES ON DYNAMIC PROPERTIES [Wplyw deformacji geometrycznej elementow zawieszenia drugiego stopnia wozka wagonu osobowego na cechy dynamiczne pojazdu]

No Abstract. [Polish]

Jakubowski, T Ofierzynski, M *Pojazdy Szynowe* No. 3, 1977, pp 10-15, 1 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: *Pojazdy Szynowe*, Warsaw, Poland

## 02 176873

### RUNNING RAIL VEHICLES OVER ACUTE ANGLE CROSSINGS [La circulacion de vehiculos ferroviarios sobre cruzamientos agudos]

A theoretical study of running over track crossings. The author examines in succession: axle movement over a crossing, the passage of a wheel over the gap of a curved crossing and the displacement of a wheel in the check rail area. [Spanish]

Alonso Abellan, JM *AIT-Revista* No. 19, Dec. 1977, pp 39-45, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

## 02 176898

### ANALYSIS OF THE INTERACTION BETWEEN VEHICLE AND TRACK

An analysis of the influence of a number of German Railways' vehicles on the permanent way shows that the Soviet method of calculation is applicable in principle to conditions existing for the German Railways, indicating also some prerequisites that must be fulfilled in this respect. The influence of definite permanent way and vehicle characteristics on the state of stress of the rails could be elaborated. [German]

Moras, E *DET Eisenbahntechnik* Vol. 26 No. 1, Jan. 1978, pp 11-13

ACKNOWLEDGMENT: British Railways

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

## 02 176902

### AIR RESISTANCE TO TRAINS IN TUNNELS

The study of the resistance of train movement in tunnels goes back to the end of the last century, when research on utilization was started, made necessary by reason of the pollution due to the combustion of coal in steam traction. Later other studies and experimental research were carried out which, however, came to an end with the diffusion of electric traction. In recent years there have appeared in technical literature memoranda and articles in which information is given of new theoretical and experimental calculations of air resistance to motive power units and rolling stock of modern type and form both in the open and in tunnels, also with reference to high speeds. Within the ambit of these calculations there falls this treatise, which, although not able to make recourse to concrete experiments, prefixes, on the grounds of traditional calculation patterns, the re-proposal of the problem, attempting to bring out the inter-dependency of certain geometrical and physical parameters characterizing a tunnel and a train, with the supplementary resistances of underground movement. [Italian]

Pellis, P *Ingegneria Ferroviaria* Vol. 32 No. 11, Nov. 1977, pp 867-875

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

## 02 178152

### DRAG ON VEHICLES IN TUNNELS

Conditions simulating a high speed ground transportation vehicle traveling in a long tunnel have been experimentally and analytically investigated to determine the effects of certain factors on the aerodynamic drag of the

vehicle. The same vehicles and tube were used in two types of tests. In one, the vehicle was in a flowing air stream but remained stationary with respect to the tube, simulating wind tunnel testing. In the other, the vehicle was propelled along the tube under air flow conditions simulating an infinitely long tube.

Harman, CM (Duke University); Davidson, JV *High Speed Ground Transportation Journal* Vol. 11 No. 2, 1977, pp 177-187, 12 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

#### 02 178276

##### TRACK STRESSES DUE TO MIXED TRAFFIC OPERATIONS AND ADVANTAGES OF THE INTERCONNECTED SYSTEMS (ROME-FLORENCE LINE)

After a review of the most salient aspects of track dynamics with respect to lateral-bed stability under the action of dynamic cross stresses transmitted by the vehicles through wheel-rail interaction, the article describes the initial results of the new tests carried out under dynamic loading with a system recently developed by the FS and which presents considerable interest. [French]

Pandolfo, A *Rail International* Vol. 9 No. 3, Mar. 1978, pp 165-178, 13 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

#### 02 178529

##### CONVERSION OF A ROTARY TEST RIG FOR ADHESION-FORCE MEASUREMENT

The development and design of test rigs for research work must take account from the start of the measuring equipment since it is the latter which mainly determines the subsequent use of the rig. This article describes the procedures when making changes to improve the dynamic behaviour of the mechanical components and the measuring equipment on a rotary test rig. A specification for the conversion of the rig was developed from a so-called weak-point analysis, and the new concept of the rig intermediate station derived from this is explained with the aid of a diagram which shows all the main features. Since the new concept is such that apart from the rotational motion all movements and the contact force of the rolls are controlled servo-hydraulically, new performance data for the test rig are obtained. The rig is also more convenient to operate. The conversion work on rotary test rig II and the necessary tests have been concluded, and the various tests for the experimental investigation of the adhesion force laws have been commenced. Suitable running-in conditions and roll forms are being developed in preliminary tests, by means of which a surface, texture and inherent tension condition in the running surfaces is obtained which approaches that of the wheel and rail. In the main test series the effect of slip, material pairing and ambient conditions on the adhesion coefficient and the coefficient of sliding friction will be examined. [German]

Albrecht, H *Eisenbahntechnische Rundschau* Vol. 27 No. 1-2, Jan. 1978, 5 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

#### 02 178534

##### THE PRESENT STATE OF THE ART OF THE WHEELSET AXLE METHOD FOR DETERMINATION OF FORCES BETWEEN WHEEL AND RAIL

Five years ago, the wheelset axle method was published. In the meantime, this method of determining the forces acting between the wheel and rail has been employed in numerous tests for investigation of the riding qualities. To enable a more reliable and simpler application of this method, the various components had to be improved. This paper describes the typical parameters of this method of measurement and discusses their effects on the accuracy of the force measurements, indicating also how these effects can be eliminated or reduced. In addition, the new method of calibration is described and possibilities for adopting this method for the solution of further problems encountered in the field of force measurements are discussed. [German]

Ostermeyer, M *Glaser's Annalen ZEV* Vol. 102 No. 2, Feb. 1978, pp 53-61

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

#### 02 178905

##### A STUDY OF TRACK MAINTENANCE FOR THE DERAILMENT DUE TO THE INTERACTION BETWEEN TRACK AND VEHICLES

Causes and prevention of freight car due to the interaction between track and vehicle have been investigated since 1964 by JNR. The role of track maintenance has been studied. The wave lengths of irregularities and the combination of alignment and cross-level have a large influence on the running safety of two-axle cars and it is necessary to check and adjust the composite figure of alignment and cross-level to prevent derailments.

Ikemori, M *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 1-6, 11 Fig., 2 Tab., 2 Ref.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

#### 02 178909

##### AN EXTENSION OF THE HURWITZ CRITERION--THE PARAMETER VARIATION METHOD

In developing new mechanical systems, the overall stability of motion should be determined in the early stage of development. Hurwitz criterion makes possible such an analytical stability study. Such a technique rapidly becomes ineffective as the number of degrees of freedom increases. The parameter variation method can make up for this deficiency of the Hurwitz criterion.

Koyanagi, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, 5 pp, 3 Fig., 1 Tab., 2 Ref.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

#### 02 178919

##### A METHOD TO CALCULATE VEHICLE VIBRATIONS AT RAIL JOINTS

While running on the track, a rail vehicle is excited to vibrate by the rail joints, the gaps in the track at the switches and crossings and by the changing elastic properties of the track. The resulting forced motion of the car body and its bogies largely depends on the kind and duration of the respective disturbance. Theoretically the forced motions can be determined by solving the set of equations with a given disturbance function. This calculation can be performed either on an analogue computer or on a digital computer. However, in view of the large number of equations, only a digital computer can normally be considered for solving such a problem, since an analogue computer with standard facilities does not have the number of components required for a simulation of the system. When using a digital computer, the set of equations is normally solved according to the Runge-Kutta method. This method involves, however, long computing times. This paper presents a computing method based on the weight function of the vehicle as an oscillatory system which results in a considerable reduction of the computing times. The method is illustrated by a simple example. [German]

Krettek, O *Glaser's Annalen ZEV* Vol. 102 No. 3, Mar. 1978, pp 72-78

ACKNOWLEDGMENT: British Railways

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DOTL JC

#### 02 178921

##### THE EVALUATION OF VEHICLE VIBRATION AND SEATS

Measurements of vibration in a variety of road vehicles in common use are compared with the guidance provided in ISO 2631-1974(E) (Guide for the evaluation of human exposure to vibration). For typical journey durations many of the vibration levels are in excess of the levels corresponding to the "reduced comfort boundaries" and "fatigue decreased proficiency boundaries" defined in the ISO Standard. Some of the problems inherent in comparing the measured vibration levels with the Standard are outlined and the need for a revised format for the Standard is discussed. A method of summarising the vibration attenuation of vehicle seats is defined and it is



shown that the isolation provided by many of the seats of the 16 vehicles used in the study is poor.

Griffin, MJ *Applied Ergonomics* Vol. 9 N Mar. 1978, pp 15-21

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

02 179062

#### TRACK/TRAIN DYNAMICS AND DESIGN: ADVANCED TECHNIQUES

These papers present a detailed state-of-the-art account of the technology and the technological needs involved with the structural mechanics of freight railroad vehicles. Important computer programs and current projects are also covered. This volume offers valuable reference information to engineers in the rail car building industry consulting engineers and manufacturers who supply the railroad industry.

Proceedings of the Conference held in Chicago, September 27-28, 1977.

Moyar, GJ (Brenco, Incorporated); Pilkey, WD Pilkey, BF (Virginia University)  
Pergamon Press Proceeding Sept. 1978, 481 pp

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

02 179115

#### AN INVESTIGATION OF TECHNIQUES FOR VALIDATION OF RAILCAR DYNAMIC ANALYSES

A linear model of the vertical dynamics of a railcar was validated by the application of spectral techniques to experimental data. Track input spectra were computed from test track surface measurements gathered in the TDOP test program. Acceleration measurements of a freight car were used to compute vehicle acceleration spectra in response to the test track. The corresponding response of the linear model was computed from the analytical transfer functions and experimental track input spectra. Validation of the linear model was based upon a comparison of corresponding analytical and experimental vehicle acceleration spectra. The truck suspension was isolated and analyzed from experimental measurements of corresponding truck and car body accelerations. Spectral functions were employed to evaluate the assumptions of suspension linearity.

Prepared in cooperation with Association of American Railroads Research Center, Chicago, Illinois for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development.

Fallon, WJ Cooperrider, NK Law, EH  
Arizona State University, Tempe, Clemson University Intrm Rpt.  
DOT-FRA-ORD&D-78/19, Mar. 1978, 105 pp, Figs., 6 Tab., 17 Ref., 2 App.

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-279996/AS, DOTL NTIS, DOTL RP

02 179121

#### USER'S MANUAL FOR ASYMMETRIC WHEEL/RAIL CONTACT CHARACTERIZATION PROGRAM

Wheel/rail geometric constraint relationships, such as the effective conicity and gravitational stiffness, strongly influence the lateral dynamics of railway vehicles. The principal curvatures of wheel and rail profiles are important parameters in the determination of creep coefficients used in rail vehicle models. In general, these geometric constraints and profile curvatures are nonlinear functions of the wheelset lateral displacement. This report is a users' manual for a computer program written in FORTRAN IV that uses iterative procedures to determine these nonlinear functions for arbitrary wheel and rail profiles. The program computes the wheel/rail contact positions, geometric constraint functions, and profile curvatures for any given wheel profile, rail profile, rail cant angle, and rail gauge for an asymmetric wheelset on asymmetric rails. Analytical methods used and program input and output are described. Results are in the form of printout, punched cards and drum plotter plots. The users' manual includes program listings, sample deck set-ups, and sample run output.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Prepared in cooperation with Association of American Railroads Research Center, Chicago, Illinois.

Heller, R Cooperrider, NK

Clemson University, Arizona State University, Tempe Intrm Rpt.  
FRA/ORD-78/05, Dec. 1977, 98 pp, Figs., 4 Ref.

Contract DOT-OS-40018

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-279707/AS, DOTL NTIS, DOTL RP

02 179122

#### RESISTANCE OF A FREIGHT TRAIN TO FORWARD MOTION-VOLUME I, METHODOLOGY AND EVALUATION

This interim report documents the results of the initial portion of an intensive investigation of the train resistance phenomenon. The history and development of prior investigations are discussed and the formulas for train resistance developed by investigators in the U.S. and abroad are analyzed with respect to their present applicability to the phenomenon. Factors contributing to the considerable discrepancies among various formulas are discussed. A methodology suitable for a quick and accurate solution of the hitherto ignored problem of the air resistance of different arrangements of the same consist is developed and utilized in determining train resistance. Preliminary estimates of reductions in train resistance and consequent fuel and cost savings resulting from possible modifications to train and track technology are given. Recommendations are made for further investigations during the remainder of this study and possible fruitful areas for new research. Two appendices explain the rationale behind the calculation of air resistance of various consist arrangements and discuss the related computer program in detail.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. See also FRA/ORD-78/04. II, Volume II--Implementation and Assessment (to be published Fall 1978).

Muhlenberg, JD  
Mitre Corporation Intrm Rpt. FRA/ORD-78/04.I, MTR-7664, Apr. 1978, 149 pp, Figs., Tabs., 35 Ref., 2 App.

Contract DOT-FR-54090

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-280969/AS, DOTL NTIS, DOTL RP

02 179126

#### AERODYNAMIC FORCES ON FREIGHT TRAINS VOLUME II--FULL-SCALE AERODYNAMIC VALIDATION TESTS OF TRAILER-ON-A-FLAT CAR (SERIES II)

Aerodynamic forces were measured on full-scale Trailer-on-a-Flat Car (TOFC) configurations and a reliable data base was established for Validation of wind tunnel test programs. The drag, side and lift forces were determined on two trailers mounted on an instrumented flat car, each by means of a specially designed force-balance system. Two TOFC configurations (Configuration 1 with a loaded buffer car leading the instrumented flat car and Configuration 2 with an empty buffer car) were tested under different wind conditions. In addition to the aerodynamic resistance of the trailers, total tractive resistance of the TOFC was measured via instrumented couplers. The results indicate good agreement between the full-scale aerodynamic drag data and the wind tunnel data from the tests at the Calspan Corporation. The wind tunnel tests conducted at the California Institute of Technology exhibited significantly higher drag values than the full-scale measurements, especially at high wind angles. The foregoing conclusions apply to both Configurations 1 and 2. It was found that Configuration 2 experienced consistently larger drag than Configuration 1. Measurement of the total tractive resistance enabled a rough estimation of the rolling resistance of the instrumented flat car. The present tests show that at 50 mph the aerodynamic drag accounts for 50 to 60 percent of total train resistance and the rolling resistance takes the remaining share. At 90 mph, the drag force amounts to approximately 55 to 70 percent of the total resistance.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Freight Systems.

Joshi, PB  
ENSCO, Incorporated Test Rpt. DOT-FR-78-19, FRA/ORD-76-295.II, Mar. 1978, 381 pp, Figs., Tabs., 14 Ref., 4 App.

Contract DOT-FR-64113

ACKNOWLEDGMENT: FRA



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PB-281823/AS, DOTL NTIS, DOTL RP

02 179135

**APPLICATION OF SLIDING BLOCKS ON WHEEL TREADS TO HIGH SPEED VEHICLES ON NARROW GAUGE LINES. EXPERIMENTS ON VARIOUS SLIDING BLOCKS TO IMPROVE ADHESION AND PREVENT WHEEL TREAD DAMAGE**

No Abstract.

Ohyama, T *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Dec. 1977, pp 187-188, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

02 179138

**VERTICAL VIBRATIONS IN RAIL VEHICLES DUE TO STOCHASTIC EXCITATION OF TRACK UNEVENNESS [Vertikale Schwingungen der Schienenfahrzeuge bei stochastischer Erregung von Gleisunebenheiten]**

Study of vehicle vibrations due to track defects is one way of assessing running safety and comfort and the stresses exerted on the various vehicle parts. The author considers the problem theoretically using a basis of mathematical statistics and the calculation of probabilities. From comparison of the results obtained with the experiments carried out using a 4-axle vehicle of the Y/B70 type, estimates have proved correct. [German]

Nguyen, HK *DET Eisenbahntechnik* Vol. 26 No. 2, 1978, pp 57-60, 6 Fig., 4 Tab., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

02 179267

**MAXIMUM PERMISSIBLE VALUES FOR TRANSVERSE FORCES FROM THE POINT OF VIEW OF TRACK DISPLACEMENT RISK. PROGRESS MADE IN RAILWAYS' RESULTS**

A survey carried out among the Railways and a study of the existing documentation made it possible to state what research remained to be done to determine the maximum permissible values of transverse forces exerted by axles on the track, from the track displacement aspect. Basically this is a study of the influence of speed, distance between axles and duration of forces.

Restrictions on the use of this document are contained in the explanatory material. UIC Cat. 40 N48.

International Union of Railways DT 66 (C138/GT3), June 1977, 80 pp, 12 Phot., 2 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

02 179290

**A MATHEMATICAL-COMPUTER SIMULATION OF THE DYNAMICS OF A FREIGHT ELEMENT IN A RAILROAD FREIGHT CAR. INTERIM TECHNICAL REPORT NO. 3**

This research studies the dynamic response of a freight element, inside a typical freight box car under service conditions, by a computer-model simulation technique. A 27 degree of freedom mathematical model has been developed to represent the freight car, truck and freight element, with the car body as a single rigid mass. This model has been validated against published railroad research data. This model is a more detailed one than most previously published simulations, and has additional characteristics. One is the option of modeling dry friction dampers by either Coulomb friction or equivalent viscous damping. A second improvement is the facility to express the response of the system in either time or frequency domain. The computer simulation shows that the critical roll mode speed of a representative 70-ton box car is around 17.5 mph. The maximum car body roll angle is 11.4 degrees peak to peak, the maximum wheel load is 69,000 lb/wheel, and wheel lift durations are 0.2-0.4 sec. For a specific freight element near the roof maximum lateral accelerations of 1.5 g peak to peak at 0.64 Hz were calculated. At 50 mph, this value becomes 0.2 g at 2 Hz. Vertical acceleration of 0.1 g at 1.25 Hz is computed for freight near the car body center of gravity at 50 mph. The mathematical model can be used for parametric studies on designs of the car body and truck. Cushioning requirements for freight/package systems subjected to vibrations inside a freight car can also be established.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Sponsored by Office of University Research, Federal Railroad Administration, Association of American Railroads, and General Motors Electro-Motive Division. Partially supported by Illinois Institute of Technology, Chicago, Illinois.

Shum, KL Willis, T  
Illinois Institute of Technology Intrm Rpt. FRA/ORD-77/28, IIT-TRANS-75-2. N3, July 1977, 130 pp, Figs., 4 Tab., 17 Ref., 3 App.

Contract DOT-OS-40103

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-282308/AS, DOTL NTIS, DOTL RP

03 052535

**TESTS ON AUTOMATIC COUPLINGS**

No Abstract.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B51/RP 14/E, Oct. 1972, n.p.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

03 053255

**VIENNA-ARSENAL VEHICLE TESTING STATION. REPORT ON THE ACTIVITIES OF THE VIENNA-ARSENAL VEHICLE TESTING STATION IN THE YEAR 1976**

This report gives a brief description of tests and other activities at Vienna-Arsenal international vehicle testing station during 1976. Coaches, railcars and wagons from 5 countries were tested for both Railways and private manufacturers. Tests on automatic coupling of wagons in unfavourable weather conditions and tests on unusual factors were also carried out. Studies were also begun which may open up new fields in the use of this station.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways AZ 30/RP 17, Apr. 1977, 23 pp, 2 Phot.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

03 053257

**WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND CONSTRUCTION TESTS ON ORE STANDARD WHEELSETS FOR WAGONS EQUIPPED WITH 920 MM DIAMETER WHEELS**

This report gives the results of the tests and studies carried out by the B 136 Specialists Committee in accordance with the recommendations of reports Nos. 1 and 2 with standard wagon wheelsets for a permissible static axleload of 22 t. The report also describes the basic test conditions.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B136/RP 5, Apr. 1977, 30 pp, 7 Tab., 22 Phot.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

03 053258

**WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND CONSTRUCTION. COMPARATIVE STUDY OF DIFFERENT TYPES OF ROLLER-BEARING AXLEBOXES FOR GOODS WAGONS ACCORDING TO UIC LEAFLET 514-I OR**

No Abstract.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B136/RP 4, Apr. 1977, 62 pp, 13 Tab., 16 Phot.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

03 053266

**STANDARDISATION OF WAGONS. PROGRAMME OF TESTS TO BE CARRIED OUT ON WAGONS WITH STEEL UNDERFRAME AND BODY (SUITABLE FOR BEING FITTED WITH THE AUTOMATIC BUFFING AND DRAW COUPLER). 3RD EDITION**

This report replaces the previous Report B 12/RP 17 (74), 2nd edition. It surveys all the tests which are at present considered as representing the complete series of tests to which a new type of wagon should be exposed. The conditions under which these tests should be made and the results to be obtained (maximum or minimum values) are laid down for each test. On account of the detailed information it contains, taking into consideration the

developments which have taken place during the last few years in the construction of goods wagons, this report constitutes a valuable basis for the design of new types of wagons.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways B 12/RP 17(77), Oct. 1977, 43 pp, 8 Fig.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

03 053272

**NON-POLLUTING SANITARY INSTALLATIONS. TOILETS OF NEW DESIGN BEING TESTED ON THE COACHES OF EUROPEAN ADMINISTRATIONS. ENQUIRY REPORT**

This report reviews the changes which have taken place as regards the new designs of toilets available on the market and their use on the different railway networks, since 1975 when the enquiry Report B 140/RP 1 was issued. A table is given synthesising the information received from the Administrations concerning tests in progress. The report finally draws some provisional conclusions concerning the advantages and drawbacks of the different types, which might provide a basis for discussion by the recently set up Specialists Committee.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B140/RP 2, Oct. 1977, 14 pp, 7 Fig., 2 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

03 169214

**GENERAL VEHICLE TEST INSTRUMENTATION MANUAL**

A General Vehicle Test System (GVTS) has been developed by the Transportation Systems Center to facilitate rail transit vehicle testing at the Transportation Test Center, Pueblo, Colorado. This system was designed to be responsive to requirements specified in the report General Vehicle Test Plan (GVTP) for Urban Rail Transit Cars (PB-250 575). The purpose of this manual is to describe the instrumentation system (Part 1) of the GVTS and the standardized techniques to be employed to ensure the acquisition of valid test data using the system. The GVTS includes measurement systems for vehicle voltage, current, acceleration/vibration, pressure, temperature, displacement, strain and test reference data. Each individual measurement system is described in detail in the Appendix of this document. This document presents a system overview of the entire GVTS as well as a summary of the instrumentation systems referenced to the applicable Standard Outputs of the GVTP. It also describes signal monitor and calibration equipment and electrical shielding and grounding techniques. Descriptions of the supporting documentation file, the inventory control system, and miscellaneous system notes are also included. References are listed in this report. A companion document, General Vehicle Test Instrumentation Evaluation (PB-269 598), reports the results of evaluative tests performed on the instrumentation systems.

See also PB-250 575.

Babb, LV

Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-06-0025) Handbook DOT-TSC-UMTA-77, UMTA-MA-06-0025-17, Sept. 1977, 243 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274543/8ST, DOTL NTIS

03 170947

**THEORETICAL CALCULATION OF THE FATIGUE PARAMETERS OF AUTOMATIC COUPLER BODIES [Rascetnaja ocenka parametrov ustalosti korpusa avtosceпки]**

Description of a method for calculating the strength of automatic couplers based on the statistical theory of fatigue breakage. [Russian]

Sljusenkov, AP Vestnik VNIIZT No. 6, 1977, pp 28-30, 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

03 170948

**FREQUENCY OF TECHNICAL INSPECTIONS OF ROLLING STOCK WITH GRADUAL OVERHAUL OF THE PARTS INSPECTED** [Periodicnost' diagnostirovaniya prostogo ob'ekta pri postepenno izmenenii kontroliruemogo parametra]  
No Abstract. [Russian]

Ridel, ZZ *Vestnik VNIIZT* No. 6, 1977, pp 30-33, 4 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

03 172000

**POSSIBILITIES OF USING AIR-CONDITIONING BY THE PELTIER METHOD IN DRIVER'S CABS OF MOTIVE POWER UNITS** [Moeglichkeiten der Peltier-Kuehlung in Fuehrerhaeusern von Triebfahrzeugen]  
No Abstract. [German]

Wiegelp, J *DET Eisenbahntechnik* Vol. 25 No. 11, Nov. 1977, pp 449-452, 5 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

03 172001

**A EUROPEAN BREAKTHROUGH--20 YEARS' FATIGUE SIMULATED IN ONE MONTH ON AN ENTIRE PASSENGER COACH BODY** [Premiere europeenne--La fatigue de 20 ans simulee en un mois sur une caisse complete de voiture a voyageurs]  
For the first time in Europe a whole passenger coach body was subjected to accelerated fatigue tests. These tests, which simulated 20 years of regular service in one month, were carried out by the Brussels laboratories of the Belgian Association of Industry (AIB). The coach being tested was an Aluisse prototype of which 1,000 aluminum units had been ordered for the renewal of the Paris Metro rolling stock. The tests confirmed the high fatigue resistance of this type of coach. [French]

*Schweizer Alumin Rundschau/Revue Suisse de Alumin* Vol. 27 No. 6, June 1977, pp 278-279, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

03 172011

**NEW RESILIENT WHEELS FOR ROLLING STOCK ON LOCAL RAIL SERVICES** [Neue gummigefederte Raeder fuer den Nahverkehr]  
These wheels were developed by the Kloecknerwerke. There are two types and consist of two rings with a parallelogram-shaped cross-section inserted between the tyre and the rim, and responding to compressive and shear forces. The article summarizes the advantages of the resilient wheel, the technical conditions to which the rubber is subjected, and describes the wheels developed by Kloecknerwerke, their assembly and dismantling procedures, their bench and in-service testing and their characteristics. [German]

Brinkmann, P *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 755-760, 2 Fig., 7 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 172013

**THE CONCEPT OF OPTIMUM RELIABILITY IN A RAIL VEHICLE, WITH A RESEARCH APPROACH FOR ACHIEVING THIS** [Zur Frage der optimalen Zuverlaessigkeit von Schienenfahrzeugen und die Strategie zur Erlangung des Optimums]  
The authors follow a survey of traditional formulae for the theory of reliability by defining the concept of economic optimum in rolling stock as reducing to a minimum the total costs of wear and depreciation in relation to its purchase price. [German]

Lisowski, Z Krettek, O *Glaser's Annalen ZEV* Vol. 101 No. 10, Oct. 1977, pp 421-426, 5 Fig., 1 Phot., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

03 172633

**THE RISING COST OF CAR MAINTENANCE**

Unit train service is causing car maintenance costs to rise on Burlington Northern, rising from 6.6% to 8.4% of operating revenues between 1974 and 1977. Design criteria for cars for conventional service are no longer applicable to cars for unit trains and traditional maintenance procedures can no longer be observed. BN now strives for a two-year maintenance cycle for its hopper cars and the sturdier components already installed, along with those showing need for improvement such as roller bearings and wheels, are discussed.

Hon, DV (Burlington Northern) *Progressive Railroading* Vol. 21 No. 2, Feb. 1978, pp 27-30, 3 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

03 172634

**BN'S NEW AUTOMATED WHEEL SHOP**

A computer inventory control system, extensive materials handling equipment and various high-production machines have been incorporated in the Burlington Northern's wheel shop at Havelock, Neb., which can turn out 96,000 wheelsets annually. The road's complete wheel needs are now met from this single facility.

*Progressive Railroading* Vol. 21 No. 2, Feb. 1978, 5 pp, 12 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

03 172647

**NEW HUNGARIAN BOGIE** [Drehgestellentwicklung in Ungarn]

A bogie featuring excellent running properties is the outcome of the consistent development design and experimental work conducted by GANZ-MAVAG. The new bogie is suitable for any track gauge and for any kind of drive or brake system. It can be used as leading or trailing bogie and contains no parts subject to wear. For this reason, it requires minimum maintenance and retains its good running properties throughout its entire life. According to the test results and their general trend, the present design may also serve as a basic concept for a bogie for 160 km/h or even higher speeds. [German]

Zupan, P Gaspar, G *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 383-390

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

03 172663

**DEVELOPMENT OF INTERNATIONAL COACH TECHNOLOGY**

[Entwicklung der Technik von Reisezugwagen fuer den grenzueberschreitenden Verkehr]  
No Abstract. [German]

Molle, P Reemtsema, K *Eisenbahntechnische Rundschau* Vol. 26 No. 10, Oct. 1977, pp 655-664, 5 Tab., 3 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 172940

**THE NEW SHINKANSEN CARS**

The Shinkansen is now thirteen years old and its cars have run more than 5 million kilometers, which is equivalent to 125 laps around the world. These cars are now being replaced. Since fall 1976 more than 360 new cars have been built. For the sake of convenience in the inspection and repair and in the handling, these cars are standardized in the same design as the original ones, except in the case of the dining cars, of the equipment liable to give trouble and of some parts which have been found troublesome in handling and maintenance. This article describes the differences between the old and the new cars.

Kitayama, T (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 9-10, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

## 03 173371

### PHASE 11 REPORT ON INSPECTIONS OF INSULATION-JACKET TYPE THERMAL SHIELDS ON TANK CARS IN ACCELERATED LIFE TESTS

Four 112A tank cars were retrofitted with one inch of a mineral fiber insulation and a steel jacket. The jacket thickness was 11 gage over the shell and 1/2 inch over the heads. Design details of each application were different. The cars were sent to the DOT Transportation Test Center at Pueblo, Colorado, where they were placed in an Accelerated Life Test (ALT) program. This program will simulate 10 years of service life by running the cars 160,000 miles and subjecting them to a series of impacts as would be encountered in switchyards. A glass fiber insulated 111A car also was included in the program as a reference base. The results of inspections after 2 to 5 years simulated life are given in this report. These inspections revealed nothing that would indicate that this type of "112J" car insulation system will not maintain its integrity over the life of a tank car.

RPI-AAR Tank Car Safety Research and Test Project, Phase 11.

Skogsberg, AM Phillips, EA  
Railway Progress Institute, Association of American Railroads Technical Center Res Rpt. RA-11-9-39/AAR R-291, Jan. 1978, 14 pp, 9 Fig., 1 App.

ACKNOWLEDGMENT: Railway Progress Institute, Association of American Railroads Technical Center

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

## 03 173372

### INTERMODALISM TOPS \$1-BILLION

As railroad intermodal revenues top \$1 billion annually, the opportunity for solid trains of containers and trailers is opening new approaches to loading, handling and unloading. The new linehaul concepts are striving for faster train makeup, lower tare, lower center of gravity and lower air resistance. The innovations being studied are summarized.

*Progressive Railroading* Vol. 21 No. 3, Mar. 1978, 3 pp, 3 Phot.

ACKNOWLEDGMENT: Progressive Railroading

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

## 03 173375

### ENERGY-MINDED HIGH SPEED RAILCAR

The SPV-2000, a diesel-torque converter driven rail passenger car, has been introduced as a successor to Budd's Rail Diesel Car. The car body is based on the Amtrak coach design and can be supplied in configurations for intercity or commuter service.

*Progressive Railroading* Vol. 21 No. 3, Mar. 1978, 2 pp, 3 Phot.

ACKNOWLEDGMENT: Progressive Railroading

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

## 03 173405

### THE U.S. STANDARD LIGHT RAIL VEHICLE--A PROGRESS REPORT

The U.S. Standard Light Rail Vehicle was designed by Boeing Vertol Company to replace the aging streetcars in several U.S. cities, and to provide an efficient vehicle for new light rail transit systems. The paper briefly describes the technical and design features of the LRV. It also describes the test program that was part of the development effort. The paper discusses test results achieved in testing and compares them with specification requirements. The paper discusses problems encountered during the test and development program. Finally the paper describes the initial introduction of the LRV into revenue service in Boston.

For Meeting, August 8-11, 1977.

Cord, JM (Boeing Vertol Company); Norton, PR  
Society of Automotive Engineers Preprint n 770680, 1977, 12 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

## 03 173588

### KEEPING HAMERSLEY'S DIESELS ROLLING

Extremes of heat and dust in a remote location make the intensively-used iron ore lines of Western Australia a tough proving ground for locomotives and maintenance routines. A simple computer program helps plan the workload at Hamersley's shops, and the uniform duty cycle allows preventive maintenance to be closely tailored to minimum standards of reliability. As traffic increases, these standards are continually being raised with the eventual aim of reducing the risk of failure in service to levels now achieved in aviation.

Williams, EH *Railway Gazette International* Vol. 134 No. 3, Mar. 1978, pp 115-118, 4 Phot.

ACKNOWLEDGMENT: Railway Gazette International

ORDER FROM: ESL

DOTL JC

## 03 173589

### MAINTAINING A 200 KM/H REGULAR-INTERVAL DIESEL SERVICE

In the 17 months which have elapsed since British Rail introduced the world's first diesel-powered trains scheduled to run at 200 km/h, the service has been expanded to embrace 46 daily round trips totalling 23,000 km. Maintenance in the two purpose-built depots at London and Bristol has been programmed so as to keep 23 out of 27 High Speed Train sets available on weekdays to cover 21 diagrams. Among problems generated by the high speed for which solutions have been found are fouling of the rear-end wind-screen by exhaust products, and excessive cab noise.

Burdon, ES (British Rail) *Railway Gazette International* Vol. 134 No. 3, Mar. 1978, pp 119-123, 4 Fig., 3 Phot., 1 Ref.

ACKNOWLEDGMENT: Railway Gazette International

ORDER FROM: ESL

DOTL JC

## 03 173601

### IMPROVEMENT OF FATIGUE STRENGTH OF CAR AXLES BY WARM SURFACE ROLLING AND AGE HARDENING AFTER COLD SURFACE ROLLING

With increase in train speeds, the fatigue strength of car axles must be increased. Japanese National Railways has been experimenting with increased resistance to fatigue cracks in the wheel-set areas of normalized axles by two methods: Warm Surface Rolling and Age Hardening After Cold Surface Rolling. Both methods were found effective in increasing axle fatigue strength.

Takahashi, R *Railway Technical Research Inst, Quarterly Reports* Vol. 13 No. 3, Rpt. No. 1007-76,77, Sept. 1977, pp 129-134, 12 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

## 03 173604

### Y.32 BOGIE TESTED AT 250 KM/H

Y 32 bogies are fitted to "Corail" coaches and passengers appreciate the quality of their suspension. About 4,000 are in service on coaches suitable for a maximum speed of 160 km/hr and they are all identical. When provided with electromagnetic brake shoes and side-motion dampers these bogies can be fitted to coaches designed for 200 km/hr operation. The article reports on the comfort factors recorded when this modified bogie was tested between Facture and Morcenx in the Landes at 250 km/hr. They confirm the quality of the vertical longitudinal and transversal stability of this bogie and the fact that it performs well when running at 250 km/hr. [French]

Daffos, J *Revue Generale des Chemins de Fer* Vol. 96 Nov. 1977, pp 602-604

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

03 173779

## THE DESIGN AND DEVELOPMENT OF HEATED, IMPACT RESISTANT WINDSHIELDS FOR LOCOMOTIVES

With the increase in speed of modern-day rail and rapid transit systems and the regrettable upsurge in vandalism in some parts of the world, the development of windshield technology has been significant in recent years. The ideal windshield has to be capable of preventing the entry of missiles, stones, and even small bullets, without the risk of severe glass particle detachment from the inside surface. This structural requirement is coupled with the need for a de-icing and de-misting capacity which can be achieved by using virtually undetectable, metallic oxide electro-conductive coatings within the windshield. For the more awkward shapes of windshield, these coatings need to incorporate complex resistivity gradings. The modern windshield has been developed to meet these and other requirements only as a result of an intensive R and D program, which is described in the paper. The use of novel test methods is also highlighted. Of particular importance, particularly to older locomotives, is the ability to, retrospectively, fit inherently safer windshields without any structural alterations in the cab. This is made possible by the careful choice of plastic and glass content, with special attention being paid to glass temper levels. On some of the world's newer High Speed Trains, even greater strides have been noted with a move toward larger, curved, fully framed, and sealed windshield units, some of which are described in the paper.

Contributed by the Rail Transportation Division of ASME for presentation at the IEEE-ASME Joint Railroad Conference, St. Paul, Minnesota, April 11-13, 1978.

Wright, RW (Triplex Safety Glass Company)

American Society of Mechanical Engineers Conf Paper 78-RT-5, 1978, 16 pp, 23 Fig., 1 Tab.

ACKNOWLEDGMENT: ASME

ORDER FROM: ESL

DOTL RP

03 173781

## THE APPLICATION OF FRACTURE CONTROL PRINCIPLES TO FREIGHT CAR CENTER-SILL STRUCTURES

Impact tests using Dynamic Tear samples were conducted on ASTM A36, A441, and A572 steels to determine their resistance to brittle fracture. The effects of grain size were also studied by normalizing plates of the as-received steel. Modern fracture control principles are applied to the data to predict the service behavior of these steels.

Contributed by the Rail Transportation Division of ASME for presentation at the IEEE-ASME Joint Railroad Conference, St. Paul, Minnesota, April 11-13, 1978.

Stone, DH (Association of American Railroads Technical Center);

Pellini, WS

American Society of Mechanical Engineers Conf Paper 78-RT-7, 1978, 9 pp, 15 Fig., 3 Tab., 5 Ref.

ACKNOWLEDGMENT: ASME

ORDER FROM: ESL

DOTL RP

03 173795

## SEVEN YEARS OF EXPERIENCE WITH THE GAS TURBINE TRAINS KNOWN AS "TURBO TRAINS"

The French-designed high-speed passenger train powered by gas turbines which is in commercial service in the U.S., France and Iran has accumulated 50 million kilometers of service. The design philosophy, results achieved in service and other facets of the applications in three nations are discussed.

Durand, C (A.N.F. - Industry, France) *Rail International* No. 12, Dec. 1977, pp 644-646, 2 Phot.

ORDER FROM: ESL

DOTL JC

03 174033

## WELDING IN THE CONSTRUCTION OF RAILROAD CARS [Le soudage dans la construction des voitures de chemins de fer]

The article discusses the recent developments in the welding processes used in the manufacture of steel and aluminum railroad car bodies. [French]

Nicolas, C *Soudage et Techniques Connexes* Vol. 31 No. 7-8, July 1977, pp 245-262

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 174038

## DIAGNOSIS OF ATTENUATIONS OF THE MOVEMENTS PROPER TO HIGH-COMFORT COACHES [Diagnosi sulle attenuazioni dei moti propri delle carrozze tipo "gran confort"]

In railway vehicles, use is made of viscous-type shock absorbers to reduce the width of oscillation of the movements of the body and bogies. In this study an evaluation is made as to what percentage each movement is attenuated by the shock absorber, what natural frequencies are changed in the presence of a shock absorber having a determinate coefficient of attenuation, and where should a shock absorber be located in order to have effect on certain movements without influencing others. In the paper, an illustration is given of all these characteristics taking as a sample a high-comfort type of coach. [Italian]

Panagin, R *Ingegneria Ferroviaria* Vol. 32 No. 9, Sept. 1977, pp 659-669

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

03 174365

## REVERSE HEAT ENGINE'S ROLE IN UNIT TRAINS

Reverse heat engines are essentially an assembly of component parts accomplishing a transformation of work into heat and the dissipation of this heat into the atmosphere. In doing this work a reverse heat engine must provide yielding resistance of such initial sensitiveness, combined with ultimate high capacity, that any of the draft or buffing actions, small or great, incident to the switching, humping, starting, and stopping of railway cars, may be modified to the lowest possible limits of stress. When a moving freight car impacts a stationary car, or when train slack is run in or out with violence, there is a transfer of energy from one car to the other. This transfer becomes more rapid as the draft gear resistance increases. At the same time the inertia force of a stationary car becomes less and less, until the steadily increasing value of the push exerted by the draft gears starts movement of the stationary car. Thus a reverse heat engine is nothing more than an efficient freight car draft gear. There are five types of standard pocket draft gears in use today: All-steel friction, combined rubber-friction, all-rubber, hydraulic-friction, and silastic rubber. Since a draft gear is primarily a cushion, it develops a cycle of work during its closure and release under the various intensities of draft and buff impact, either when operating in the moving train or when it is being collided singly or in groups of cars during train make-up. This draft gear cushioning cycle is evaluated exactly like the steam or gas engine work cycle. Engine action is considered positive on the basis of heat being changed to work, causing acceleration. The draft gear cycle is negative, work being changed to heat, causing deceleration. The importance of maintenance of draft gears with too much slack is emphasized.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Wallace, WD

PLM, Incorporated Conf Paper 1977, pp 187-192

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

03 174366

## COUPLING SYSTEMS FOR COAL CARS

The coupling mechanism which enables the rotary dumping of hopper and gondola cars while still coupled in a train is described.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Kern, DW

PLM, Incorporated Conf Paper 1977, pp 181-184

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

03 174367

## HOW TO SPEC A FREIGHT CAR TRUCK (AND WHY)

Specifications or bases for selection are given for several railway car components, based on cost, expected service life, interest rate, etc.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Hood, CN, III

PLM, Incorporated Conf Paper 1977, pp 153-179

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

### 03 174368

#### AUSTENITIC MANGANESE STEEL

In heavily-loaded, unlubricated, sliding applications Hadfield's manganese steel develops smooth polished interface surfaces, eliminating galling and resultant high frictional resistance; wear is minimized; wear on the mating steel is minimized; a high surface hardness is developed while retaining a tough elastic substructure; and it has a low rate of crack growth. On account of these properties it has many applications in railroad car components.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Eddy, TA

PLM, Incorporated Conf Paper 1977, pp 145-151

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

### 03 174369

#### NO AVERAGES, PLEASE

The service life of train wheels varies from 20,000 miles up to 500,000 miles. In many cases wheels are removed from service for causes other than normal wear, e.g., thermal stresses due to braking, sliding due to excessive braking forces, flange wear, etc. Recommendations for longer wheel wear include: use of heat-treated class C wheels (well worth the 10 percent premium), turn trains on a regular basis (to distribute the wear more evenly) and no use of reclaimed rail that is reversed (if necessary to use this way, grind the gage side before use).

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Berg, NA

PLM, Incorporated Conf Paper 1977, pp 139-142

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

### 03 174387

#### WELDED STEEL CONSTRUCTION OF AUTO TRAINS

[Geschweisste Stahlkonstruktionen fuer Krafftfahrzeugtransportwagen]

For transportation of motor vehicles (passenger cars, buses, trucks) through two Alpine tunnels, special trains are used. They consist of loading and unloading cars and the carrier cars. The design and welded construction of these cars are described. The highly stressed parts are made almost exclusively of high strength steel. More than half a million vehicles annually are carried on these auto trains. [German]

Hiltebrand, HG *Schweissen und Schneiden* Vol. 29 No. 9, Sept. 1977, pp 378-380

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

### 03 174388

#### WELDED CONSTRUCTION OF THE ET 472/473 TRAINS OF THE SUBWAY OF HAMBURG BUILT OF MALLEABLE ALUMINUM ALLOYS

[Schweisskonstruktion aus Aluminiumknetlegierungen fuer die Triebzuege ET 472/473 der Hamburger S-Bahn]

The construction of the undercarriages, side panels, front panels, and roof of the subway cars of AlZnMg1 and AlMgMn alloys is described. The processes used were MIG, TIG, and resistance spot welding. By extensive use of extruded profiles, it was possible to adopt an economical design and to match the cross sections to the prevailing requirements. [German]

Boenisch, M (Messerschmitt-Boelkow-Blohm GmbH) *Schweissen und Schneiden* Vol. 29 No. 9, Sept. 1977, pp 375-378

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

### 03 174391

#### BRITISH RAIL INCREASE COMMITMENT TO CNC

Numerical control is increasingly being used in the workshops of British Rail Engineering Ltd, to overcome batch production problems and shortages of skilled labor. A new long-bed CNC lathe by Churchill completes all the turning on long axle shafts for locomotive wheels in approximately 26 percent of the time previously needed. A Churchill NC chucking lathe is used to machine steel castings with weights of 356 kg, and heavier. Drive is automatically shut down if the spindle speed exceeds a safe level. In the machining of railway axle boxes, ability to precision bore large-diameter deep holes is the dominant criterion, and a Herbert DeVlieg Jigmill with CNC has been chosen by Crewe Works for the task. For refurbishing major items, including large diesel engines, a large-capacity Maxi Check computer-controlled measuring machine is used to check items at the premachining stage. Features which need to be remachined, and by how much, are rapidly identified.

Astrop, AW *Machinery and Production Engineering* Vol. 131 No. 3384, Oct. 1977, pp 394-398, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

### 03 174392

#### LOW-COST NC TURNING AT BRITISH RAIL, WOLVERTON

This article cites applications of relatively low-cost NC machines for the production of fairly small parts at low levels of output in repair work performed by British Rail Engineering Ltd at its Wolverton works. In particular, a Hydro NC 540 lathe has been installed which has eliminated difficulties experienced with sequence-controlled automatics and manually operated center lathes as well as the use of high-cost special tooling.

*Machinery and Production Engineering* Vol. 131 No. 3390, Dec. 1977, pp 545-546

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

### 03 175266

#### IMPROVED PASSENGER EQUIPMENT EVALUATION PROGRAM TECHNOLOGY REVIEW. SEMI-ANNUAL REPORT

The status of three foreign rail technologies is analyzed in this the first of four semiannual reports. The three technologies are tilting car body mechanisms, pantographs, and passenger train brake systems. Tilting car bodies are used to increase train speed in curves while remaining within the safety requirements of overturning moment and the established levels of passenger comfort. Systems being developed in Europe and Canada are discussed. As train speeds increase in electrified corridors, power collection becomes a problem due to uneven track and catenary undulations. Slow response time due to pantograph mass is being overcome by staged pantographs where the final element is small and thus can respond to rapid changes in distance between the car roof and catenary. Two-stage pantographs and pantographs for tilting car bodies are discussed. Increasing train speeds on existing corridors requires improved braking systems so as not to exceed present signaling installations and corridor stopping distances. New concepts of brake systems in development are discussed.

Dow, AL

Unified Industries, Incorporated, Federal Railroad Administration FRA-/ORD-77/74, Oct. 1977, 32 pp

Contract DOT-FR-74249

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277264/8ST, DOTL NTIS

### 03 175480

#### STRUCTURAL ADEQUACY OF FREIGHT CAR TRUCK CASTINGS AND WHEELS

The structural adequacy of freight car truck castings and wheels to resist fatigue damage is reviewed. The environmental load data described in an earlier report under this program and additional load data which have only recently become available are used to calculate the expected fatigue life under various assumptions of the stresses present in the components. It is found that under most conditions the components should not develop fatigue cracks. This confirms the observation that there are a relatively small number of fatigue failures of these components in service. Since failures of

these components can lead to serious derailments, it is important that the circumstances leading to a higher risk of fatigue failure be identified so that under these circumstances truck components can be subjected to more frequent and stringent inspections under the railroad freight car safety standards of the FRA. The results of tests to determine the fatigue strength of wheel plates are also described. The tests showed that there is a substantial safety margin with respect to fatigue when one considers the effects of lateral loads acting on the wheel.

See also report dated May 75, PB-244 090.

Johnson, MR  
IIT Research Institute, Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-77-18, Oct. 1977, 82 pp

Contract DOT-TSC-727

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-278034/4ST

03 176681

**FUTURE DEVELOPMENT OF THE RUNNING TECHNIQUES OF NEW DB DIESEL UNITS USING THE TORSION FRAME BOGIE** [Die Weiterentwicklung der Lauftechnik neuer Brennkrafttriebwagen der Deutschen Bundesbahn durch Torsionsrahmendrehgestelle]

The new torsion frame bogie improves running quality for a wide range of speeds by affecting the vibration frequency and the reaction forces exerted on the rail. Stable running is obtained up to speeds of over 140 km/h despite low wheel loads and relatively short wheel bases. Measurements carried out as regards wear suggest that distances of over 600,000 km could be covered before the wheels need reprofiling. [German]

Zboralski, D Kirchlechner, H *Glaser's Annalen ZEV* Vol. 101 No. 11, 1977, pp 446-453, 12 Phot., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

03 176682

**THE MECHANICAL PART OF A LOCOMOTIVE WITH THREE-PHASE CURRENT TECHNOLOGY** [Der mechanische Teil einer Lokomotive in Drehstromtechnik]

As part of the research carried out by the DB in order to obtain a locomotive that can be used for both passenger traffic (speeds up to 160 km/h) and freight traffic, the article discusses the specific problems linked with the development of the mechanical part of such a locomotive which will be of the Bo' Bo' type and will have a weight of 84 t, 37t of which will be for the mechanical part. Following this research, the DB has ordered 5 prototype locomotives which will be delivered in 1979. [German]

Oed, R Reitmeier, W *Eisenbahntechnische Rundschau* Vol. 26 No. 12, Dec. 1977, pp 861-866, 2 Tab., 6 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 176714

**VERY HIGH SPEED PRE-PRODUCTION TRAINSETS TGV A FEW MONTHS BEFORE DELIVERY** [A quelques mois de leur sortie, les rames TGV de preserie]

The two pre-production trainsets will shortly be delivered: one, which will be fitted with a small laboratory, will be used for measuring performance in traction, braking, stability, aerodynamics and comfort, between Strasbourg and Mulhouse; the other will be operated commercially between Paris and Lyons to obtain passenger reactions. [French]

Metzler, JM *Revue Generale des Chemins de Fer* Dec. 1977, pp 646-651, 1 Fig., 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

03 177178

**DESIGNING FOR MOBILITY--CRANES ON RAILS**

What is probably the most advanced 75 ton capacity railway breakdown crane in the world is now under evaluation by British Rail at Doncaster. This

attractive diesel-hydraulic powered design is the first, and perhaps the most striking, of a new range of rail cranes from the Cowans Sheldon works in Carlisle. The revolving superstructure is carried on a four-axle carriage which incorporates a specially developed suspension system to give the correct ride index for high speed rail travel and provision for lateral axle adjustment to allow the negotiation of severe curves. The two-element jib is fabricated from high-tensile low alloy steel, quenched and tempered, with the telescopic section sliding on pads faced with special wear-resistant material. Power for the telescoping motion is provided by twin double-acting hydraulic cylinders located inside the jib, and the derricking motion is powered by twin double-acting cylinders connected between the underside of the jib and the top plate of the revolving superstructure. Self-propulsion of the crane is by a hydrostatic drive via transmission gearboxes on the two outermost axles driven by fixed displacement motors supplied by variable displacement pumps.

*Engineering (London)* Vol. 217 No. 11, Nov. 1977, pp 962-963

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

03 177188

**WHY ALUMINUM IS WINNING IMPORTANT RAILWAY CONTRACTS**

Traditionally railway rolling stock has been manufactured using steels, and this has been influenced by the cost of maintenance, availability of materials, and design. Now, with radical changes in design concepts a change has been made to the use of aluminum, using modern automatic welding processes in rail-car construction. Factors influencing this choice of material include lower costs, efficiency of equipment and weight. Welding problems with aluminum extrusions are discussed, and some accelerated fatigue life tests on railroad car body shells are described.

Zehnder, J (Schweizerische Alumin, Switzerland) *Metal Construction* Vol. 9 No. 11, Nov. 1977, 3 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 178283

**EFFECT OF THE THIN STAINLESS SHEETS USED AS LINING FOR COACH ROOFS ON HEATING BY RADIATION** [Einfluss einer Dachblechung aus Edelstahl rostfrei an Reisezugwagen auf die Waermeeinstrahlung]

The stainless-steel external sheathing used for passenger cars is fully satisfactory. A study has shown that roofs of thin steel sheets produces even better results: in very warm weather, the temperature of bright steel sheets rises only 8 degrees C, but about 26 degrees C in the case of painted metal sheets. As a result, the installed air-conditioning power can be reduced by 15 percent. In winter, losses of heat by radiation are also less marked when bright steel sheets are used. [German]

Froboess, U *Leichtbau der Verkehrsfahrzeuge* Vol. 21 No. 6, 1977, pp 125-127, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

03 178480

**PLASTICS FOR MASS TRANSIT VEHICLES**

Polymeric material used in mass transit vehicles are: wall and ceiling panels, seats, cushions, fabrics, carpets, elastomers, ducts, windows and lighting diffusers, thermal and acoustical insulation, floors, electrical insulation, and cab ends and other exterior panels. The flammability aspects of plastics are considered a major factor in the choice of materials.

Litant, I (Transportation Systems Center)

American Society for Metals Tech Rpt. N76-31, 1976, 5 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 178491

**NEW ELECTRIC LOCOMOTIVES**

Two new U. S. electric locomotives, designed for heavy-duty freight service, have the most modern thyristor control and a number of novel features. In terms of tractive effort and its wide range of horsepower, one model is

believed to be the most powerful locomotive in the world. This article covers the major features of these new electric locomotives and also provides some comparisons with modern-day diesel-electric locomotives in the U. S. The GM-6C model is rated at nominally 6000 diesel equivalent hp, and utilizes a Co-Co truck arrangement. The GM-10B model is rated at nominally 10,000 diesel equivalent hp, and uses an unusual Bo-Bo-Bo truck arrangement, new for the U. S. For each locomotive, a description is given of the carbody, trucks, traction motors, auxiliary equipment and power transmission and controls. Performances are reported. Maintenance costs are claimed to be 64% that of a diesel electric locomotive. Power is picked up by pantograph.

Ephraim, M, Jr (General Motors Corporation); Quinn, HE *ASME Journal of Mechanical Engineering* Vol. 100 No. 1, Jan. 1978, pp 43-49, 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 03 178498

# USE OF WELDED ALUMINUM ALLOY STRUCTURES IN THE TRANSPORTATION FIELD [Impiego delle strutture saldate di lega di alluminio nei trasporti]

A comparison between steel (non alloyed, Fe 42 grade) and aluminum (AlZnMg 1, AlMgSi 1 and AlMg 2.5) seen from the designer's standpoint, 5 points are considered: unit cost of material, amount of material required to provide the same structural properties, labor, dependability in use, advantages of light alloys. The first item is not encouraging in Italy: light alloys are 5 to 8 times more expensive than steel. However, the aluminum alloys make it possible to reduce weight more than three times in comparison with steel, if calculated on the basis of yield point, or more than 1.5 times on the basis of U.T.S. Welded joints on aluminum require 30% more time, but large extrusions reduce the number of joints necessary for aluminum. Dependability is equal or superior to steel, and corrosion resistance is better. Running costs are markedly lower with aluminum structures. [Italian]

Fici, C *Alluminio* Vol. 46 No. 11, Nov. 1977, pp 427-433

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 03 178546

# AIR-CONDITIONING THE APT

Air conditioning of the Advanced Passenger Train for British Railways is achieved with equipment designed to minimize weight and energy without sacrificing cost, reliability and ease of maintenance. Environment of the passenger is maintained at levels equal to that of the best present BR passenger equipment. The system provides also for car heating.

Graves, T (British Rail) *Railway Gazette International* Vol. 134 No. 5, May 1978, 3 pp, 1 Fig., 1 Phot.

ORDER FROM: ESL

DOTL JC

## 03 178687

# SYSTEM TECHNIQUES IN VEHICLE DEVELOPMENT AS EXEMPLIFIED BY A HIGH-SPEED RAILCAR FOR 300 KM/H [Die systemtechnik bei Fahrzeugentwicklungen--Dargestellt am Beispiel eines Hochgeschwindigkeitstriebfahrzeugs fuer 300 km/h]

The described project definition of the high-speed railcar for 300 km/h is in the nature of a preliminary study the purpose of which is to clarify, with reasonable economy of effort, what requirements the vehicle should meet, what solutions are basically possible, whether they are practicable, and what vehicle concept shows the most promise. On the basis of the result, a catalogue of requirements and then a vehicle specification have to be drawn up. Both are inputs for the main and detail studies. The catalogue and the specification differ in that the former contains "desired" objectives which are to be aimed at but which are not incontrovertible requirements for the acceptance of a vehicle development. In preparing the catalogue it can thus be clarified whether and to what extent (for reasons of economy or standardization), possibilities exist for integration with other vehicle designs or new knowledge should be given consideration. The specification, on the other hand, lays down "must" objectives which are mandatory for vehicle development and design. The decision-makers are thus given a series of basics which are suitable for the early identification of problem areas, for making decision processes transparent and hence executable, and for setting

priorities so as to reduce the decision risk. In this way the procedures applied in the project definition of a 300-km/h railcar can be of interest for other projects. [German]

Luebke, D *Eisenbahntechnische Rundschau* Apr. 1978, pp 197-204, 14 Fig., 1 Tab., 6 Ref.

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

## 03 178691

# SOUND RADIATION OF RAIL WHEELS AND THE TESTING OF SOUND-ATTENUATING WHEELS FOR LOCAL AND LONG-DISTANCE RAIL TRAFFIC [Die Schallabstrahlung der Schienenraeder und Erprobung schallgedaempfter Raeder fuer Fern-und Nahverkehr]

The rolling noise of trains is substantially reduced and the shrieking of wheels in the curves of local transport systems completely avoided by means of a new type of sound-attenuating wheel. The sound absorbers are of simple design, inexpensive, and are long-lasting. They are easily fitted to the wheel, and also wheels already in service can be equipped without difficulty. The absorber increases the weight of the wheel by only a few percent. [German]

Raquet, E Tacke, G *Eisenbahntechnische Rundschau* Apr. 1978, 5 pp, 19 Fig., 4 Ref.

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

## 03 178946

# DESIGN TRENDS IN LIGHT RAIL VEHICLES

Because articulated trams offer a number of technical and operating advantages over single cars, their popularity is increasing. Power ratings of 10 kW/ton are now considered desirable to give 1.3 meter per second acceleration and a top speed of 80 km/h. Chopper control is more costly and heavier than switched resistances, and it can only be justified when regenerative braking raises the level of energy saved to around 30 percent.

Scholtis, G Waite, W *Railway Gazette International* Vol. 134 No. 6, June 1978, pp 381-383, 1 Fig., 3 Phot.

ORDER FROM: ESL

DOTL JC

## 03 178953

# IMPROVEMENT OF PASSENGER COACH ACCOMMODATION

This article describes the investigations carried out by JNR to improve the design and ride quality of its passenger cars.

Okada, N (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 4, 1978, pp 16-17, 2 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

## 03 178954

# SUBWAY CAR INSPECTION AND REPAIR MANAGEMENT SYSTEM

Fifty years after the first subway section was built in Tokyo, the network includes eight lines with a total route length of 164.7 km and 1900 cars carrying 5.2 million passengers daily. This article describes the vehicle inspection and repair management system in detail.

Mochizuki, M (Teito Rapid Transit Authority, Japan) *Japanese Railway Engineering* Vol. 17 No. 4, 1978, pp 12-13, 2 Fig., 1 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

## 03 179064

# STRUCTURAL MATERIALS DESIGN FOR RAIL TRANSIT CARS

This paper discusses the detail design practice and computer analyses used to achieve the car body structures for the two vehicles designed and being manufactured by the The Boeing Vertol Company. These two cars are the United States Standard Light Rail Vehicle (SLRV), and the Chicago Transit Authority Vehicle (CTAV) Rapid Transit Car.



Dennis, MJ (Boeing Vertol Company); Schagrin, EB  
American Society for Metals Tech Rpt. N76-24, 1976, 7 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 179124

## REPORT ON THE 5TH INTERNATIONAL WHEELSETS CONGRESS, TOKYO, JAPAN, 20-23 OCTOBER 1975

A summary is given for each of the thirty technical papers presented at the International Wheelsets Congress held in Tokyo, Japan, 20-23 October 1975. The papers were presented by international experts in rail research and covered a wide range of wheel/rail topics, including dynamic forces, material characteristics, stresses, failure mechanics, fatigue, maintenance and noise.

Prepared for U.S. Department of Transportation, Federal Railroad Administration.

Bray, DE  
Oklahoma University Spec Rpt. FRA/ORD-77/65, Oct. 1977, 17 pp, Figs.

Contract DOT-OS-40091  
ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

03 179145

## FUTURE Z2 ELECTRIC RAILCARS ON SHORT INTERCITY ROUTES IN THE HIGH-SPEED ERA [Pour les courtes relations intervalles a l'heure du TGV, les futures automotrices electriques de ligne Z2]

Characteristics of Z2 electric railcars, due to be introduced on short intercity routes, running at speeds of 160 km/h, at the end of 1979. [French]

Ketzer, J *Vie du Rail* No. 1638, Apr. 1978, pp 4-8, 2 Tab., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Editions NM, 75440 Paris, France

03 179157

## RESEARCH ON THE OPTIMISATION OF WHEELSETS AT THE SNCF. PART 2 [Recherches sur l'optimisation des essieux-axes de la SNCF (2eme partie)]

The article is a continuation of the one published in the Revue in March 1975 on rotary deflection fatigue in wheelsets. The purpose of Part 2 is to give the results of research on the mechanical treatment of axle surfaces, particularly shot-blasting. This treatment can either increase the reliability of existing axles, or allow the dimensions of the axle shafts to be reduced in the future while maintaining the same degree of reliability. [French]

Revillon, A *Revue Generale des Chemins de Fer* Feb. 1978, pp 114-119, 4 Fig., 4 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 166126

**DEVELOPMENT OF COAL-BURNING DIESEL ENGINES IN GERMANY. A STATE-OF-THE-ART REVIEW**

In view of the recurring interest in coal-dust fueled IC engines, German programs and activities on the development of coal-dust engines are reviewed on the basis of a comprehensive literature and patent search, supplemented by personal communications with German engineers who had participated in these programs. The German development projects were independently conducted by 5 industrial companies from 1916 to 1944. Under programs running for periods of 8 to 24 yr about 19 coal-dust engines in the power range 10 to 600 hp and at speeds between 160 and 1600 rpm were built and tested. The review includes a discussion of problems associated with the use of solid fuels in IC engines. Technical and performance data of the German engines are tabulated and supplementing information is given. From the literature data the conclusion can be drawn that the German programs were successful in solving most basic problems of the coal-dust engine, at least to an acceptable degree. Although 2 of the 19 engines allegedly were used in routine factory operation, at the time of program termination the coal-dust engine was not yet ready for commercial utilization. Considerable work must still be done before the coal-dust engine would be commercially applicable and competitive with other coal-operated prime movers, in technical as well as in economical respects. A comprehensive bibliography and list of patents are included. (ERA citation 02:033677)

Soehngen, EE

Soehngen (E) and Associates, Energy Research and Development Administration Aug. 1976, 139 pp

Contract PO-WA-76-3387

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

FE/WAPO/3387-1

04 166795

**POSSIBILITIES FOR REGENERATIVE BRAKING OF DC TRACTION VEHICLES**

Since electrical traction was introduced into rail traffic, it has always been the goal to convert the kinetic energy of the vehicles during braking into electrical energy and to feed that back into the railway electrical system. However, the great expense required for the vehicles, the lack of means for fast control and the small regenerative effect achievable heretofore have rendered difficult or have completely impeded the introduction of the regenerative brake on a wide basis. It is only recently that power electronics, with which any energy flow can be controlled and regulated arbitrarily by means of thyristors, has opened new possibilities for electrical regenerative braking in dc traction vehicles. This relates not only to the vehicle equipment but also to the power supply systems of the contact-line electrical systems. Thus, if new analyses are to be made of regenerative braking of electrical traction vehicles, then, besides the vehicle facilities, it is also necessary to investigate the problems of transmission and reuse of the fed-back energy. (ERA citation 02:032783)

Translated from Siemens-Z. 46 n8 p692-699 1972.

Wagner, R *Siemens Review* 1972, 26 pp

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

UCRL-Trans-11210

04 169006

**COMPOSITE FLYWHEEL DEVELOPMENT COMPLETION REPORT, MAY 1--SEPTEMBER 30, 1976**

The program to design, fabricate, and performance test a prototype, vehicular-sized, composite flywheel is described. The overall program scope encompasses development of both the flywheel and its containment; however, the FY 1976-1976T objective was directed toward development of the flywheel and testing it in existing facilities. The development effort was successful, leading to successful testing of a flywheel design which demonstrated an energy density performance of 10.1 Wh/lb during spin testing. The initial application selected for development of the composite flywheel was the heat engine/flywheel hybrid propulsion system for a vehicle. This application was selected by the ERDA Advanced Physical Methods Branch staff because of its high potential for conservation of petroleum fuel in both the near and far-term time frames. Other applications, such as utility load leveling, represent potential areas for significant energy

savings but require more extensive development programs and funding resources. Successful development of a high-performance, composite, vehicular flywheel represents one step along the development path leading toward larger, higher-energy storage flywheel applications. (ERA citation 02:045607)

Huddleston, RL Kelly, JJ Knight, CE

Union Carbide Corporation, Energy Research and Development Administration May 1977, 44 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

Y-2080

04 169026

**DEMONSTRATION OF AN INDUCTOR MOTOR/ALTERNATOR/FLYWHEEL ENERGY STORAGE SYSTEM. TECHNICAL QUARTERLY PROGRESS REPORT NO. 2, SEPTEMBER 28, 1976--DECEMBER 28, 1976**

The overall objective of the ERDA program described is to demonstrate new technology associated with a novel concept for a high-speed flywheel energy storage system. The concept, consisting of a high-speed composite flywheel combined with an integral inductor-type motor/alternator, offers the possibility of a small, lightweight package with high energy storage capability. The basic technology demonstrated in this program will have application to a number of flywheel energy storage systems. The demonstration unit will have a nominal rating of 20 kVA. The program will develop a flywheel energy storage system sized for a 3000 lb battery electric van. The balance of the report discusses the energy storage package: (1) design and fabrication of the inductor motor/alternator/flywheel; and (2) design and fabrication of the solid state power conditioner and control breadboard. (ERA citation 02:045850)

General Electric Company, Energy Research and Development Administration Dec. 1976, 36 pp

Contract EY-76-C-02-4010

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

COO-4010-2

04 169129

**DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)**

The design and varied applications of flywheels and reaction wheels are investigated in these research reports gathered in a worldwide literature survey. Such diversified applications as satellite stabilization, surface vehicle propulsion, energy transfer devices, and inertia or friction welding are reviewed. (This updated bibliography contains 180 abstracts, 57 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0768. See also NTIS/PS-77/0882.

Habercom, GE, Jr

National Technical Information Service Oct. 1977, 187 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-77/0883/7ST

04 169130

**DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE)**

The design and varied applications of flywheels and reaction wheels are investigated in these Government-sponsored research reports. Such diversified applications as satellite stabilization, surface vehicle propulsion, energy transfer devices, and inertia or friction welding are reviewed. (This updated bibliography contains 183 abstracts, 69 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0767, NTIS/PS-75/743, and NTIS/PS-75/070. See also NTIS/PS-77/0883.

Habercom, GE, Jr

National Technical Information Service Oct. 1977, 189 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-77/0882/9ST

04 169744

**RATE OF HEAT RELEASE IN DIESEL ENGINES**

In this report, the concept of heat release in diesel engines is compared with reaction rates in petrol engines as a means of describing combustion. The intimate relationships between heat release, cylinder pressure development and cylinder pressure spectra are illustrated. A combustion model for the prediction of heat release and combustion noise, based primarily on physical aspects of diesel combustion system design, is put forward. This model indicates that fuel droplet size and the temperature of the cylinder contents are of prime importance in determining cylinder pressure noise excitation. The relationship between cylinder pressure spectra and combustion induced engine noise is described and used to show how the combustion model can predict combustion induced noise at the design stage. A simplified procedure based on the results of this modelling is put forward to predict combustion induced noise as a function of rate of pressure rise, speed and bore and applied to a Standard Engine Structure. As an approximation the prediction formulae are also given in terms of initial peak rate of heat release, engine speed and bore. Mechanical noise aspects of diesel engines, although important, are excluded from the work. (Portions of this document are not fully legible)

Anderton, D

Southampton University, England, Transportation Systems Center Final Rpt. DOT-TSC-OST-77-56, Oct. 1977, 147 pp

Contract DOT-TSC-1101

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275421/6ST, DOTL NTIS

04 170945

**NEW DUAL-SYSTEM LOCOMOTIVE WITH BBC 3-PHASE MOTORS FOR 600 V DIRECT CURRENT OR DIESEL ENGINE DRIVE [Neue Zweikraft-Lokomotiven mit BBC-Drehstromantriebstechnik für 600 V Fahrleitungs- und Dieselbetrieb]**

Description of this 100-tonne BB locomotive ordered by the Duisburg-Homberg Ports and Railways Joint Operating Company. It is designed for a maximum speed of 40 km/h with a rating of 1000 kW for electric traction or braking, and 475 kW for diesel traction. [German]

Teich, W *Elektrische Bahnen* Vol. 48 No. 10, Oct. 1977, pp 249-254, 6 Fig., 2 Tab., 2 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

04 172005

**COACH ELECTRICITY SUPPLY INSTALLATIONS [Energieversorgungseinrichtungen fuer Reisezugwagen]**

Examination of all types of electricity supply for coaches on electrical lines. Present situation, results obtained on various systems, future prospects on European Railways. [German]

Knau, U *Eisenbahntechnische Rundschau* Vol. 26 No. 10, Oct. 1977, pp 665-672, 16 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

04 172081

**AN EXPERIMENTAL INVESTIGATION OF A COAL-SLURRY FUELED DIESEL ENGINE**

A single cylinder 1360 cc diesel engine was operated on a slurry of 15 percent by weight solvent refined coal and jet fuel. The coal was pulverized to a nominal size of 2 micrometers. Test results indicate that the slurry fuel provides engine power and fuel consumption levels comparable to those of diesel and jet fuels. Although wear rates appeared moderate, conventional fuel injection systems are inadequate for long-term use. /GMRL/

For Meeting held September 26-30, 1977.

Marshall, HP (Virginia Polytechnic Institute &amp; State University);

Walters, DC, Jr (Walters Repair and Restoration)

Society of Automotive Engineers Preprint n 770795, Sept. 1977, 10 pp

ACKNOWLEDGMENT:

ORDER FROM: ESL

04 172652

**THREE-PHASE A.C. DRIVES ON RAIL VEHICLES: EXPERIMENTAL UNITS, PROTOTYPES, STANDARD UNITS [Drehstromantriebstechnik in Schienenfahrzeugen Versuchseinheiten, Prototypen, Serien]**

The paper reports on the electrical equipment of the rail vehicles so far built or under construction for main line railways, underground railways and tramways. The principal data and circuit diagrams of some prototypes and standard vehicles are given. [German]

Teich, W *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 371-382, 43 Ref.

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

04 172667

**STATIC CONVERTERS USED AS VOLTAGE REGULATORS ON ALTERNATING CURRENT MOTOR VEHICLES, AND THE CONDITIONS WITH WHICH THEY MUST COMPLY**

[Netzstromrichter als Spannungsstellglied fuer Wechselstrom-Triebfahrzeuge bei unterschiedlichen Anforderungen]

Paper delivered at the Graz Symposium in April 1977. The author defines these conditions: Continuous and virtually instantaneous voltage control over the whole utilisation range; avoidance of generating harmonic disturbance caused by signalling and telecommunications; a power factor approaching 1 in the traction network; an acceptable price justified by the benefits resulting from the given conditions. [German]

Marten, F *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 356-362, 10 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

04 172937

**AUTOMATIC CONTROL OF ROTARY TYPE DIESEL LOCOMOTIVES FOR SNOW REMOVAL**

Among the JNR operated lines, a total of one third inevitably require snow removal work to keep them open to traffic in spite of snow falls in winter. JNR has more than a hundred diesel locomotives equipped with snow plows. These are either the Russell snow plow or the rotary type. For the rotary type, it is necessary to have a well trained, well qualified crew capable of judging the speed of the operation which is directly related to the depth of the snow on the track, and of directing diverse maneuvers for grade crossing and tunnel operations. To relieve the necessity for such a high degree of operational skill on the part of the crew by partially automating the control of these rotary snow plows, an experiment has been conducted in JNR and promising results were obtained. These are summarized in this article.

Nagase, K (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 18-19, 3 Fig., 1 Phot., 2 Ref.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

04 173163

**APPLICATION OF THYRISTORS IN MODERN ELECTRIC TRACTION ROLLING STOCK [Zastosowanie tyrystorow w nowoczesnym elektrycznym taborze trakcyjnym]**

Basic information on modern locomotives manufactured in Great Britain, the Federal Republic of Germany, Belgium and Sweden is given. Polish achievements in the production of SCR high-power electronic equipment for traction rolling stock are discussed. [Polish]

Czapla, J Giziński, Z *Przegląd Elektrotechniczny* Vol. 53 No. 3, Mar. 1977, pp 117-120, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 173167

**ELECTRIC LOCOMOTIVES FOR 15 KV 16 2/3 AND 50 HZ WITH BBC THREE-PHASE PROPULSION FOR USE IN HEAVY INDUSTRY [Elektrische Lokomotiven fuer 15 kV 16 2/3 und 50 Hz mit BBC-Drehstromantriebstechnik fuer Schweren Industrieinsatz]**

A series of electric locomotives with three-phase propulsion was put into service in the Ruhr region of West Germany in 1976. The operating conditions and the traction demands of the motive power units are explained. The body of the locomotive is described, with emphasis on the three-phase propulsion technique which is claimed to have been used for the first time in an electric locomotive. The first experiences on hand show that the motive power units meet fully the expectations placed on them. [German]

Maiss, KJ Teich, W *Elektrische Bahnen* Vol. 48 No. 4, Apr. 1977, pp 95-103, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 173168

**NETWORK PARTS OF AC RAIL MOTOR VEHICLES WITH CURRENT-CARRYING THREE-PHASE DRIVE [Netzteile fuer Wechselstrom-Triebfahrzeuge mit Stromgefuehrtem Drehstromantrieb]**

Frequency converter systems for feeding of three-phase brushless traction motors of electric locomotives from single phase catenary networks can be operated with impressed current or with impressed voltage in the intermediate dc smoothing circuit. The function of different supply parts for systems with impressed current are compared. Line-commutated converters with phase-angle control, self-commutated extinguishable converters with sector control and self-commutated pulsating converters with sinusoidal current regulation are considered. The advantages with regard to power supply load of the pulsating converter are pointed out. [German]

Dreimann, K Ciessow, G *Elektrische Bahnen* Vol. 48 No. 4, Apr. 1977, pp 90-94, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 173169

**INDUSTRIAL NICKEL CADMIUM BATTERIES**

When looking for a power source one consideration an engineer will take is the energy density of each alternative. And it is precisely in this area that the battery, as a primary source of power, displays its weakest face. For in spite of much aggressive research, a battery has yet to be developed which will economically match the energy density of, for example, the internal combustion engine. But nevertheless the storage battery continues to play a vital role in almost every walk of life. The article discusses the applications, performance and development of one of the most versatile battery types--the nickel cadmium cell.

Albon, C *Chartered Mechanical Engineer* Vol. 24 No. 9, Oct. 1977, 4 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 173373

**NEW LOCOMOTIVE FOR SP**

Four prototypes of the TE70-4S diesel electric locomotive, developed by Morrison Knudsen, have entered experimental service on Southern Pacific. This four-axle 2800-hp unit is powered by a Swiss-built Sulzer 12-cylinder supercharged engine. A German-developed hydrostatic cooling system is also used.

*Progressive Railroading* Vol. 21 No. 3, Mar. 1978, 3 pp, 3 Phot.

ACKNOWLEDGMENT: Progressive Railroading  
ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

04 173377

**ASYNCHRONOUS TRANSMISSION WITH STATIC CONVERTER TESTED BY SNCF [Essai de transmission asynchrone avec convertisseur statique a la SNCF]**

After using the asynchronous motor for some twenty years, the SNCF has carried out tests for supplying current by means of a static converter on an experimental unit consisting of a CC 14000 locomotive and a powered

luggage van. The author reviews the results obtained. Close collaboration between the makers of the motors and the inverters should result in an economical dual-current tractive unit. [French]

Cossie, A *Revue Generale des Chemins de Fer* Oct. 1977, pp 517-529, 23 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 173387

**REVIVAL OF THE DIESEL ENGINE: HIGH SUPERCHARGING [Renouveau du moteur diesel: la haute suralimentation]**

After giving a brief outline of Diesel engine performance since 1950, the author describes the new technique of high pressure supercharging, which is currently being developed by the large manufacturing firms. [French]

Direct request c/o General M. de Brebisson, 1 Place Joffre.

Fournet, J *Defense Nationale* Jan. 1978, pp 107-124, 5 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Comite d'Etudes de Defense Nationale, 1 Place Joffre, 75700 Paris, France

04 173388

**THE IDEA THAT DRIVES US ON: HIGH SPEED [Une idee force: le TGV]**

The different writers describe progress in work on the infrastructure and building of motive power vehicles and coaches for future high speed trains. [French]

Caire, D *Chemins de Fer* No. 326, Sept. 1977, pp 193-243, Photos.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Association Francaise des Amis des Chemins de Fer, Gare de l'Est, Paris 10e, France

04 173394

**PROCEEDINGS OF THE 11TH MEETING OF THE SCIENTIFIC COMMITTEE FOR TRACK AND OPERATING HELD IN BRUNSWICK ON 9 AND 10 MARCH 1977 ON THE SUPPRESSION OF WHEEL SLIP BY THE INSTALLATION OF A MODIFIED FORM OF BRAKING CONTROL DEVICE ON POWER STOCK [Niederschrift ueber die 11. Sitzung des Wissenschaftlichen Ausschusses fuer Bau-und Betriebstechnik (WAAB) am 9. und 10. Maerz 1977 in Braunschweig: Wegfall des Durchrutschweges durch Ausruistung der Triebfahrzeuge mit dem Bremswegueberwacher in modifizierter Form]**

No Abstract. [German]

Voss, G  
German Federal Railway DB: Dok 4663, 1977, 8 pp, 2 Tab., Apps.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: German Federal Railway, Friedrich-Ebert-Anlage 43-44, 6 Frankfurt am Main, West Germany

04 173398

**CHOPPER CONTROL OF 1500 V D.C. TRACTION MOTORS**

Application of chopper control in d.c. railway traction was developed in the sixties and has extended from combinations limited to the motors to combinations with rheostatic or regenerative braking, which are capable of dealing with any traction problem. This article describes the chopper with rheostatic braking as used on Netherlands Railways (NS) "sprinter" rolling stock.

Whiting, JMW *GEC Journal of Science and Technology* Vol. 44 No. 1, 1977, pp 13-21, 13 Fig., 1 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: General Electric Company, Limited, Hirst Research Center, East Lane, Wembley, Middlesex HA9 7PP, England

04 173404

**REGENERATIVE CHOPPER PROPULSION SYSTEM FOR MODERN TRANSIT TRANSIT**

The regenerative chopper dc propulsion system offers a substantial economic saving over more conventional types of dc traction systems. A description of operation is presented for one of the various regenerative systems that is

presently being used. A simplified economic analysis is then utilized to identify that the economic advantages of the system are readily achievable by the transit operator. The contribution of the separately excited dc traction motor to this economic gain is identified.

For Meeting, August 8-11, 1977.

Kimball, JG (AiResearch Manufacturing Company)  
Society of Automotive Engineers Preprint n 770681, 1977, 12 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 04 173419

### 4000 HP DIESEL LOCOMOTIVES FOR TRUNK LINES

[Magistral'nyj teplovoz moscnost'ju 4000 L.S.]

Technical characteristics of this Russian-made diesel locomotive, which can be worked on trunk lines with track gauge of 1520 and 1435 mm. [Russian]  
Filonov, SP *Elektricheskaya i Teplovoznaya Tiaga* No. 12, 1977, pp 20-21, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

## 04 173427

### USE OF TRANSFORMERS AND SMOOTHING COILS IN ALTERNATING CURRENT TRACTIVE UNITS [Transformateurs et inductances de lissage pour vehicules moteurs a courant alternatif]

Transformers have been built for tractive units from the beginning of electric traction. In many instances it is only because of continuous modification of the transformer that new vistas in tractive unit development have been opened up. The authors make particular reference to dimensions of transformers for the supply of static converters controlled by the network or by pulsing. They also mention the current state of development of traction transformers for 16 Hz 2/3 and 50 Hz, and indicate future trends in this field. [French]

Bohli, WD *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 724-734, 2 Tab., 16 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

## 04 173431

### STUDY OF THE BRUSH-COLLECTOR SYSTEM [Estudio del sistema de escobilla-colector]

The author attempts to list basic scientific principles which could be used to combat the many problems inherent in the brush-collector system. He describes the various elements of the system, and goes on to discuss the physical and chemical phenomena which occur, with an analysis of the most interesting effects. The article ends with a discussion of collector maintenance checking methods for direct current railway tractive units. [Spanish]  
Alvarez Soto, A *AIT-Revista* No. 18, Oct. 1977, pp 19-39, 16 Phot., 25 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Madrid, Spain

## 04 173782

### HIGHER FUEL EFFICIENCY FOR EMD DIESEL LOCOMOTIVES

The energy crunch has created penalties in fuel costs whereby railroads are experiencing the highest fuel bills in their history. Electro-Motive Division of General Motors Corporation, as a major manufacturer of diesel-electric locomotives, is dedicated to increasing the fuel efficiency of its diesel locomotives. Since the introduction of the "40 Dash Two" Series of locomotives in 1972, EMD has made significant advances in improving locomotive fuel efficiency via basic design changes to the Model 645 diesel engine to improve its thermal efficiency and also by changes in the locomotive support systems to reduce parasitic losses. Future locomotive models will continue this trend in improved fuel efficiency through further advances in the design of engine components and support systems.

Contributed by the Rail Transportation Division of ASME for presentation at the IEEE-ASME Joint Railroad Conference, St. Paul, Minnesota, April 11-13, 1978.

Kotlin, JJ Williams, HA, Jr Duntzman, NR (General Motors Corporation)  
American Society of Mechanical Engineers Conf Paper 78-RT-4, 1978,

12 pp, 12 Fig., 3 Tab.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

## 04 173789

### NEW ELECTRIC LOCOMOTIVES FOR THE TAIWAN RAILWAY ADMINISTRATION

The Taiwan Railway Administration has purchased 74-2800 kw, six-axle electric locomotives for freight and passenger service from the General Electric Co., U.S.A. The catenary voltage is 25 kv, 60 Hz. The track gage is 1067 mm (42 in.). The locomotives are double-end with full width cabs, and have a nominal weight of 96 metric tons (35,280 pounds per axle) and a maximum speed of 110 km/h (68 mi.h). Propulsion power is notchless and provided by phase-control of thyristors. Thirty-five of the units have a 3 phase, 440 volt, 60 Hz, 350 kw motor-alternator for trainline coach power.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference, April 11-13, 1978, St. Paul, Minnesota.

Moon, CG Rawson, RH (General Electric Company)  
Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8 IA, 1978, pp 25-30, 10 Fig.

ACKNOWLEDGMENT: IEEE  
ORDER FROM: ESL

DOTL RP

## 04 174018

### UNITED STIRLING GOES FLAT OUT FOR FUTURE EXPANSION

With a target of 1982 set for the production of Stirling engines, the Swedish United Stirling Company is concentrating on development of a twin-crank-shaft layout instead of the previous v-configuration. Although a Stirling engine is likely to cost 50% more than a comparable diesel engine when in production, it has a high thermal efficiency of about 36%, a multi-fuel capability, extremely low exhaust emissions and a low noise level. Decisions on the production of a range of engines with outputs of 40, 75 and 150 kw, for possible use in public transport vehicles are likely to be taken in 1980.

Hartley, J *Engineer* Jan. 1978, 3 pp, 3 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 230956)  
ORDER FROM: Morgan-Grampian, Incorporated, 16 West 61th street, New York, New York, 10023

DOTL JC

## 04 174032

### ACTUATING DEVICES FOR CONTACTLESS CONTROL SYSTEMS FOR RAILWAY MOTOR VEHICLES

Typical components of output actuating devices in contactless control systems are considered. Analytic expressions are given for calculating loads on elements. Improvements are recommended for standard thyristor-switch circuits to enhance their noise immunity.

Gol'dshtein, AI Priednieks, EV Sidorova, NN Uzars, VY Feoktistov, VP *Soviet Electrical Engineering* Vol. 47 No. 8, 1976, pp 89-93

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 04 174039

### 3000 V GROUP E656 DC ELECTRIC LOCOMOTIVES [Le locomotive elettriche a corrente continua 3.000 vol gruppo E 656]

The 3,000 volt direct current electric locomotives group E656 which have recently been brought into service on the Italian network (at the end of May 1977, 48 locomotives were in service), are the series units having the highest installed power on the Italian State Railways. These locomotives derive from the E 645 and E 646 already in service; they have the same motors, which, however, have been constructed with insulation in class F and H, and have a greater ventilation, for which the power of each motor reaches the one-hour rating of 400 kW. The total power of the locomotives has thus increased from the 4,320 kW. rating of the E 645 and E 646 models to 4,800 kW rating of the E 656. The E 656 locomotives can reach the speed of 160 km per hour, for which they are used for heavy passenger trains at higher speeds, as compared with the E 646, on the main electrified lines. The number of units ordered is 211, which thus will represent, together with the E 444 and the already mentioned E 646 locomotives, a total of 532 locomotives which will

make possible the running of all the more important passenger trains. A description is given of the main characteristics of the E 656 locomotives, and an illustration is also given of the variations as compared with the E 645 and E 646 locomotives, with particular reference to the electrical equipment of new design, to the traction, control and block circuits, the auxiliary equipment, and the pneumatic circuit. [Italian]

Masi, E (Italian State Railways); Mercatali, U *Ingegneria Ferroviaria* No. 7-8, July 1977, pp 553-587

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 04 174395

##### TRACTION DRIVE WITH A COMMUTATOR-FREE MOTOR [Trakční pohon s bezkomutátorovým motorem]

The use of the drive is considered. The main properties of the converter, the motor, and the regulation are investigated. The problem of a suitable current system and motor type is analyzed, and the advantage of the use of an induction motor for vehicles of dc traction is pointed out. [Czech]

Danzer, J (Vyzk Lokomotiv, Czechoslovakia) *Elektrotechnický Obzor* Vol. 66 No. 6, June 1977, pp 360-364, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 04 174397

##### NEW TRAMS FOR MELBOURNE

ASEA is delivering electrical and mechanical equipment for 100 trams for Melbourne, Australia during the years 1974-1977. This article presents some information about the tram project. The background of this order is given, and then the main contractor and the customer are presented. The differences between the Gothenburg tram delivered by ASEA and the Melbourne tram are briefly discussed. Finally, a general presentation of the project is given, with the main emphasis on the traction components and their control.

Friden, L (Allmänna Svenska Elektriska, Sweden); Coltman, R *ASEA Journal* Vol. 50 No. 4, 1977, pp 75-82

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 04 175426

##### HYDROGEN-FUELED RAILROAD MOTIVE POWER SYSTEMS: A FEASIBILITY STUDY

Under U.S. Energy Research and Development Administration sponsorship, and as part of its transportation energy conservation activity, a special assessment of prospects for railroad-system use of hydrogen fuel was conducted in the summer of 1976. Based on contacts with railroad organizations and individuals in government, industry, and research organizations, the feasibility and desirability of converting conventional diesel-electric locomotives to hydrogen operation were evaluated. Such a step is shown to be technically feasible and would provide another alternative--in addition to hydrocarbon synthetic fuels and railway electrification--for moving U.S. railroad systems away from today's near total dependency on petroleum. Environmental benefits would also accrue. The study report provides (1) the overall rationale for developing hydrogen railroad motive power systems, (2) an assessment of technical feasibility, and (3) a nominal development and demonstration program plan. (ERA citation 03:007076)

Foster, RW Escher, WJD  
Escher Technology Associates, Energy Research and Development Administration Sept. 1976, 252 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

CONS-4707-1

#### 04 175539

##### NORTHEAST CORRIDOR IMPROVEMENT PROJECT TASK 204: ELECTRIC MULTIPLE-UNIT CAR AND LOCOMOTIVE CONVERSION FOR DUAL-VOLTAGE, DUAL-FREQUENCY OPERATION

The report covers engineering requirements of converting electric MU cars and locomotives operating on the Northeast Corridor for dual-voltage,

dual-frequency operation during and after rehabilitation of the electrification system for 25 kV, 60 Hz power. Technical considerations included compatibility of vehicles with electrified system; apparatus required on the vehicles for operation of 25 kV, 60 Hz, including pantograph, potential transformer, vacuum interrupter, high-voltage fuse, lighting arrester, primary-current transformer, main transformer and high-voltage conduit, cable, cable-support insulators, connectors, and terminator; modification of all power systems for frequency desensitivity; battery-sustained interior lighting; cab signal modifications; rehabilitation of old equipment; and testing requirements.

Prepared in cooperation with Klauder (Louis T.) and Associates, Philadelphia, Pa. See also report dated Oct 77, PB-272 745.

De Leuw, Cather-Parsons and Associates, Klauder (Louis T.) and Associates, Federal Railroad Administration Final Rpt. FRA/NEC-PO-78/7, F204-47, Sept. 1977, 287 pp

Contract DOT-FR-76048

ACKNOWLEDGMENT: NTIS  
ORDER FROM: onal Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161

PB-277950/2ST

#### 04 175718

##### APPLICATION OF ENERGY STORAGE POWER SYSTEMS TO NONHIGHWAY TRANSPORTATION

The brief summary of nonhighway transportation systems includes a description of the annual energy consumption and duty cycle of each system. The prospects for future energy storage devices are presented and possible applications of energy storage power systems are discussed. (ERA citation 03:012805)

Bolger, JG Epps, RC Jansen, JF Miller, AB O'Connell, LG  
California University, Livermore, Energy Research and Development Administration May 1977, 49 pp

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

UCRL-52333

#### 04 176016

##### FUEL EFFICIENCY IMPROVEMENT IN RAIL FREIGHT TRANSPORTATION: MULTIPLE UNIT THROTTLE CONTROL TO CONSERVE FUEL

During tests performed in conjunction with the Burlington Northern and Union Pacific railroads and AMTRAK, significant fuel savings were realized by using a semi-automatic throttle control device or fuel saver system to take one or more units of the locomotive consist off-line when the available power and tractive effort exceeded the demand. This procedure effectively lowered the horsepower per ton ratio of the train, improved power management in various terrains, and decreased the rate of fuel consumption.

Prepared in cooperation with Transportation Systems Center, Cambridge, Mass. See also report dated Dec 75, PB-250673.

Jacobs, ME  
Federal Railroad Administration, Transportation Systems Center Final Rpt. FRA/ORD-78/13, Feb. 1978, 58 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279457/6ST, DOTL NTIS

#### 04 176690

##### TESTING NEW TURBO-ENGINES IN COMMERCIAL SERVICE ON THE PARIS-CAEN ROUTE [Nouveaux turbomoteurs à l'essai en service commercial sur Paris-Caen]

For some months a gas turbine train set in commercial service has been equipped with two new traction turbo-engines each developing 1,200 kW at nominal power, instead of the 820 kW provided by the turbo-engines in service until then. Performance is noticeably improved and there are considerable savings in energy and maintenance. [French]

Senac, G *Vie du Rail* No. 1632, Feb. 1978, pp 5-7, 1 Fig., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: French National Railroads, 610 Fifth Avenue, New York, New York, 10020

04 176871

## TECHNICAL EVALUATION OF TRANSPORT DRIVE SYSTEMS [Zur Technischen Bewertung von Transportantriebssystemen]

The paper reports on two methods which have been put forward in the form of theses at the "Friedrich List" Hochschule fuer Verkehrswesen in Dresden. Gaertner evaluates according to the effective output per unit of installed mass or installed volume, respectively, while Wenkel uses reference drive systems for comparison. Deutsche Reichsbahn's motive power units are evaluated according to these methods and the results compared with the operating experience. From this limits are derived for the practical application of these evaluation methods. [German]

Rose, H (Hochschule fuer Verkehrswesen Friedrich List) *Glaser's Annalen ZEV* Vol. 101 No. 8-9, Aug. 1977, pp 292-302, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 176872

## MULTIPLEXED CONTROLS ON UNDERGROUND TRAINS

As the sophistication of control and monitor functions on modern underground trains increase, so the limitations of the conventional "point-to-point" wiring technique become more apparent. To overcome this problem, a time-division multiplexing system has been developed for possible incorporation on future London Transport trains. This paper outlines the philosophy and development behind the system.

Harding, MA *Institution of Electrical Engineers, Proceedings* Vol. 125 No. 1, Jan. 1978, pp 49-53, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

04 176884

## NEW SLUGS FOR THE SOUTHERN

The booster or slug units which Southern Railway is putting in service are used exclusively in major classification yards, releasing diesel switchers for other services. Southern teams its slug units with one or two diesel switchers, depending on their assignments as a means of augmenting tractive effort to utilize available horsepower at low speed. While Southern has used such units for many years, its latest models incorporate improvements.

*Progressive Railroading* Vol. 21 No. 4, Apr. 1978, pp 51-52, 4 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

04 177162

## SNCF BB 15000 THYRISTOR LOCOMOTIVES. FIVE YEARS SERVICE EXPERIENCE [Les locomotives a thyristors BB 1500 de la S.N.C.F. 5 ans d'experience en service]

The author refers to the design of this series of locomotives, their characteristics and their performance. He mentions the benefits derived from the use of thyristors and describes the electrical equipment. The last part of the article gives information on the reliability in service of the BB 15000 locomotives and their ease of maintenance. [French]

Coget, G *Revue Generale des Chemins de Fer* Vol. 96 Nov. 1977, pp 579-588, 2 Tab., 10 Phot.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 177164

## EFFECT OF SHORTCIRCUITED SWITCHED SECTION OF ELECTRIC TRACTION MOTOR ON THE MAIN MAGNETIC FLUX IN TRANSIENT CONDITIONS [Vliyaniye korotkozamknutykh kommutiruemykh seksii tyagovogo elektrodvigatelya na glavnyi magnitnyi potok v perekhodnykh rezhimakh]

Results of computer-aided calculation and of an experimental verification of the effect of switched sections on the main magnetic flux of a dc machine under transient conditions of operation are presented. It is shown that the value of the magnetizing force of switched sections under the transient conditions of operation constitutes a considerable magnitude in relation to the total magnetizing force of eddy currents in a magnetic system of electric machines. [Russian]

Khomenko, BI Vol'vich, AG Avakov, VA Velikanov, SA Stepanenko, AS *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 919-922

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 177179

## REDUCTION OF TORQUE AS AN AID IN PREDICTING THE SERVICE RELIABILITY OF CARBON BRUSHES IN SINGLE-PHASE COMMUTATOR MOTORS [Die Drehmomentminderung als Hilfe fuer die Bewaehrungsprognose von Kohlebuersten auf Einphasenkommutatormotoren]

For the freight locomotive series 151 of the West German Railroad System, the service reliability of different types of carbon brushes was compared to the supposed service criteria, and evaluated on the motor test field for the same types of brushes. The crucial point of these criteria is the variable torque reduction with these individual types of brushes at low motor speeds and constant starting current. [German]

Herrmann, W *Elektrische Bahnen* Vol. 48 No. 6, June 1977, pp 141-144, 1 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 177183

## APPLICATION OF MICROPROCESSORS TO AC AND DC ELECTRIC-MOTOR DRIVE SYSTEMS

This paper is a progress report on current microprocessor applications and the potential for their increased utilization. Microprocessors in dc-motor drives are used for speed control, for servo position control, and for monitoring functions. The ac-motor drives, microprocessor are used to generate firing pulses for the thyristors in cycloconverters and inverters to meet prescribed values of frequency and waveform. The paper predicts that microprocessors will appear first in high-performance drive systems, then in the logic and control functions of special and standard industrial drives, and finally in the firing circuits as techniques are developed to carry out the computations rapidly enough to minimize the dead time.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Kusko, A (Kusko (Alexander) Incorporated) *Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-IA*, 1977, 3 pp, 12 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

04 177187

## ADDITIONAL LOSSES IN PWM INVERTER-FED SQUIRREL CAGE MOTORS

When asynchronous motors are fed from semiconductor inverters, additional losses are generated due to the non-sinusoidal voltage shape. In this paper studies on modulation principles lead to a system which minimizes the additional copper losses. Then these losses are calculated for this modulation system considering the frequency dependent impedances of the motor.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Raphael, H (Norwegian Institute of Technology) *Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-IA*, 1977, pp 932-936, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

04 177189

## THREE-PHASE A.C. DRIVE SYSTEMS FOR TRACTION VEHICLES

AEG-TELEFUNKEN has examined various static-converter systems for the drive of traction vehicles. A system constructed for d.c. supply is introduced. This is being tested in an underground railway two-car unit belonging to the Berliner Verkehrs-Betriebe (BVG). Alternative equipment arrangements are given for a universal locomotive of the German Federal Railway (Deutsche Bundesbahn).

Ciessow, G Goelz, G Grumbrecht, P *AEG[Telefunken Progress* No. 3, 1977, pp 88-96

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 177192

**MODERN CHOPPER PROPULSION CONTROL SYSTEM FOR RAPID TRANSIT APPLICATIONS WITH HIGH REGENERATION CAPABILITY**

This paper describes a rapid transit propulsion system with the following features: minimum size and weight; minimum contactor operation for mode changes; maximum regeneration commensurate with system capability; a fixed-frequency crystal-controlled chopper; and separately-excited traction motors with flashover protection. The equipment has been thoroughly tested on a flywheel system with most rapid transit system characteristics either duplicated or simulated. A prototype equipment was installed on a Chicago Transit Authority development car and run on the GE Test Track in Erie, Pa. Over one thousand trouble-free miles have been run.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Bailey, RB (General Electric Company); Williamson, DF Stitt, TD  
Institute of Electrical and Electronics Engineers Conf Paper n  
77CH1246-8-1A, 1977, pp 417-427, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

04 178277

**THREE-PHASE TRACTION CURRENT FOR DIESEL AND ELECTRIC LOCOMOTIVES FOR FAST PASSENGER AND HEAVY FREIGHT SERVICES [Traccion trifasica en locomotoras diesel y electricas para servicio de mercancías pesadas y servicio rapido de viajeros]**

The authors examine the advantages of using three-phase asynchronous induction motors as compared with the conventional commutator motors. [Spanish]

Koerber, J Teich, W *AIT-Revista* No. 19, Dec. 1977, pp 11-23, 14 Fig., 2 Tab., 19 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

04 178441

**THE DB'S ET 420 ELECTRIC RAILCAR [Der ET 420 der DB]**

ET 420 railcars are in service in Munich, Dusseldorf, Stuttgart and Frankfurt/M. Their main features are: high adhesion, thyristor control, aluminium body, air suspension, anti-skid device, automatic control of running, wayside-to-train radio links, automatic control of the braking system. The article describes the construction of the latest model, as well as its electrical equipment, in great detail. [German]

*Lokomotivtechnik* No. 12, 1977, pp 1-80, 1 Tab., 96 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Lokomotivtechnik, Frankfurt am Main, West Germany

04 178443

**THREE-PHASE CURRENT PROPULSION SYSTEM FOR RAILWAY VEHICLES. 4TH PART: SYSTEM FOR UNITS SUPPLIED FROM THE CATENARY [Drehstromantriebstechnik fuer Schienenfahrzeuge. Teil 4: Systeme fuer Fahrleitungsgespeiste Fahrzeuge]**

No Abstract. [German]

Koerber, J Strecker, H *Elsners Taschenbuch der Eisenbahntechnik* DB: Dok 4693, 1978, pp 245-279, 2 Tab., 31 Phot., 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

04 178447

**PRINCIPLES GOVERNING THE DEVELOPMENT OF A DEVICE FOR AUTOMATIC CONTACT-LINE VOLTAGE CONTROL IN THE CASE OF REGENERATIVE BRAKING [Principy postrojenja ustrojstva teleavtomaticheskogo regulirovaniya naprijazeniya dlja ucastka s rekuperacij]**

No Abstract. [Russian]

Mirosnichenko, RI *Vestnik VNIIT* No. 1, 1978, pp 7-12, 3 Fig., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2, Moscow B-174, USSR

04 178451

**SINGLE-HANDED TRACTION CONTROLLER**

The single power-handle master controller of the Budd SPV-2000 rail diesel car combines in one compact device the functions of the brake valve, throttle, reverser, double-heading cock and MU pilot valve. The concept is based on the pneumatic system, including many standard components such as the 26-F control valve, J-type relay valve and other standard car and locomotive components. The system is compatible with standard railroad braking arrangements. In addition to normal friction brakes, the SPV-2000 is equipped with two types of dynamic braking regulated also by the controller. An automatic spring-actuated parking brake is also part of the system.

*Progressive Railroading* Vol. 21 No. N6, June 1978, pp 81-82, 3 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

04 178485

**COMPUTER SIMULATION OF THE GM UNIT INJECTOR**

Descriptions of both a complex and a simplified version of the mathematical model of GM's fuel injector are presented, along with a model for linkage dynamics simulation. The models include a new and self-consistent development of the injection pressure and flow equations. Experimental verification of this simulation demonstrates the model's adequacy.

For Meeting held February 27-March 3, 1978.

Scullen, RS (General Motors Corporation); Hames, RJ  
Society of Automotive Engineers Preprint n 780161, 1978, 20 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 178494

**COAL SLURRY FUELS A DIESEL**

A diesel engine will run on a slurry of coal in jet fuel-- but given the present state of the art, not for very long. Researchers at Virginia Polytechnic Institute investigated slurry operation using a one-cylinder research engine fitted with special pressurized fuel delivery. Their results show fuel consumption and power characteristics comparable to conventional diesel operation, but with accompanying problems of fuel system clogging. If injection pump and nozzle could be made compatible with pulverized coal, the latter might replace as much as 30% of liquid fuel weight. The mixture used by VPI researchers consisted of finely pulverized coal (around 2 micrometer particle size) suspended in Jet-A fuel with a proprietary emulsifier. The coal was obtained from a solvent refining process known to yield extremely low levels of sulfur and ash.

*Automotive Engineering* Vol. 86 No. 1, Jan. 1978, pp 67-69

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 178545

**FIRST SERIES-BUILT 50 KV LOCOS DELIVERED**

South African Railways is receiving its 25 electric locomotives for operation of the 50-kV 50 Hz Sishen-Saldanha iron ore line recently built. These Class 9E units will be operated in multiples of three for handling 202-car trains with a gross trailing weight of 20,200 tons. The full-width carbody is reduced to about half its full height to provide clearance for the pantograph and other roof-mounted equipment under the high-voltage a-c catenary. Details of trucks, roof equipment, electrical equipment, control and multiple-unit circuits and braking system are given.

*Railway Gazette International* Vol. 134 No. 5, May 1978, 4 pp, 3 Fig., 3 Phot.

ORDER FROM: ESL

DOTL JC

04 178552

**EMD: HARD-LINING WITH LASERS**

With what is believed to be the largest industrial use of high-powered laser technology, Electro-Motive Division is hardening diesel cylinder lines. The



reasons for adopting this method of hardening the wearing surface of the iron casting as opposed to more conventional methods of heat treatment are discussed.

*Railway Age* Vol. 179 No. 12, June 1978, p 52, 2 Phot.

ORDER FROM: ESL

DOTL JC

## 04 179137

**SERIES RM: THE FIRST THYRISTOR LOCOMOTIVE ON THE MINING RAILWAY LINE FROM KIRUNA TO NARVIK** [Baureihe RM: die erste Thyristorlokomotive auf der Erzbahn Kiruna-Narvik]

Using the thyristor technique and stepless control, better adhesion and automatic control can be obtained. Special anti-skid adjustments can give an increase of some 30 percent in adhesion. The constant secondary voltage from the transformer is sent to converter points to be rectified. In the motor field circuit there are two semi-controlled series-switched converter bridges. The locomotive is fitted with a rheostatic brake. [German]

Lundberg, CG *Elektrische Bahnen* Vol. 49 No. 2, 1978, pp 41-46, 1 Tab., 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

## 04 179144

**GAS TURBINE TRACTION: POTENTIAL AND PROSPECTS**

[Gazoturbinnaja tjaga: vozmoznosti i perspektivy]

No Abstract. [Russian]

Gukovskij, GE *Zheleznodorozhnyi Transport* No. 3, 1978, pp 58-60

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2, Moscow B-174, USSR

## 04 179163

**A NEW CONTROL METHOD TO REDUCE INDUCTIVE INTERFERENCE CAUSED BY THYRISTOR VEHICLE**

This article deals with a new method of reducing interference due to current harmonics generated by thyristor-controlled traction vehicles, and compares it with the conventional multi-stage arrangement used.

Kawase, S Matsuhashi, T *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Dec. 1977, pp 180-181, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

## 04 179263

**PERFORMANCE CONFIRMATION OF NEW DRIVING GEAR**

For electric locomotives, nose-suspended motors are most widely used because they are structurally simple and easy to maintain. However, this arrangement does pose a few problems. Hence the development of a new system to keep gear shafts parallel and make the system maintenance-free. This involves the replacement of the conventional suspension plain bearings by cylindrical roller bearings.

Miyanishi, K *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Sept. 1977, pp 143-144, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

## 04 179981

**DEVELOPMENT AND USE OF CURRENT CHOPPERS IN ELECTRIC TRACTION**

The paper describes the chopper type traction and braking equipment manufactured by Jeumont-Schneider and used on French National Railways and its properties. Its performance is compared with that of conventional equipment and it is shown that the chopper also has some properties of its own which have no parallel. The operational principles where the chopper is represented by a change-over switch and circuit characteristics are described.

Moury, P (Jeumont-Schneider Company) *French Railway Techniques* No. 4, 1977, pp 148-159, 12 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

## 04 179982

**ADDITIONAL S.N.C.F. ELECTRIC MOTOR COACHES OF THE "Z2" TYPE**

The general arrangement of the sets is shown diagrammatically. The design is a two-car unit, permanently coupled in normal service. The two cars are connected by an inter-communication arrangement. The vehicle bodies are constructed of corrosion resistant steel and are of two types, one for the motor coach and one for the trailer. The power bogie carries two fully suspended motors. Torque is transmitted to the axle by a universal joint and hollow shaft system. The gears are of the helical type so as to reduce gear noise. The axle boxes are connected to the bogie frame by links fitted with rubber bushes.

Coget, G (French National Railways) *French Railway Techniques* No. 4, 1977, pp 177-187

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

05 053265

**REPORT ON TESTS WITH STABILISING ARTICULATION, PARTICULARLY THE BRAKING TESTS AT EILTE AND THE COMPRESSION TESTS AT VAIRES**

This report covers the results obtained in the braking tests at Eilte and the compression tests at Vaires. Operating conditions were simulated at Eilte. At Vaires, on the other hand, static conditions were aimed at with a view to studying the stabilising system under more controlled conditions. The tests were carried out with vehicle formations 1, 2 and 7. The object of the tests was: to check the functioning of a vertical and horizontal stabilising articulation; to compare the longitudinal compression forces sustained with the vertical and horizontal stabilising articulation with those sustained with the screw and buffer articulation and with the vertical stabilising articulation; to collate the quantitative values, particularly as regards the efficacy of the vertical and horizontal stabilisation system, for the calculation programme of the B 125 Specialists Committee. This report deals with formations 1 and 7. A mathematical check is made for these two formations. The efficacy values  $n_{sv}$  (vertical stabilisation) and  $n_{sh}$  (horizontal stabilisation) are determined. [German]

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B51/RP 20, Apr. 1977, 59 pp, 36 Fig.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

05 053276

**PROGRAMME OF TESTS ON THE BRAKE RIG. PLACING IN SERVICE OF THE VIENNA ARSENAL BRAKE TESTING MACHINE**

The report describes the acceptance tests and subsequent development work connected with the simulation of winter conditions for brake tests. An important section deals with the B 132 Standard Test Programme for the study of disc brake performance in winter conditions. The report concludes with a description of the machine and its associated instrumentation and suggests potential areas of study for which the installation could be used.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways Final Rpt. B 132/RP 2, Oct. 1977, 36 pp, 2 Fig., 2 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

05 173157

**NETWORK APPROACH TO BRAKE PIPE LEAKAGE**

Network models are presented to describe the effects of brake pipe leakage. The pressure distribution along the brake pipe of a multi-car train is treated through either of two ladder network models. Each network section represents a single car length of brake pipe and contains a series element and a shunt element. The two models differ only in the shunt element selected. This element may be either a flow sink or an orifice. In both models the overall effect of leakage depends on its location relative to the locomotive. When the leakage occurs further from the locomotive it exerts a larger influence on the pressure distribution. These leakage effects are formulated in quantitative terms from the models.

Paper for Meeting, November 27--December 2, 1977.

Katz, S (Concordia University, Quebec); Cheng, RM  
American Society of Mechanical Engineers n 77-WA/FIcs-10, 1977, 8 pp, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

05 173785

**BRAKING DUTY IN NORTH AMERICAN FREIGHT TRAIN SERVICE AND EFFECTS ON BRAKE EQUIPMENT, BRAKE SHOES AND WHEELS**

Changes in train consist makeup brought about by modern types of larger and high capacity freight cars have had noticeable effects on the type and amount of train braking necessary for safe and adequate train speed and

slack control. This paper is the result of recent investigations into the amount of braking duty, the intensity and duration of braking horsepower on car and locomotive wheels. It also examines effects of forces resulting from braking and slack actions on train operations over all types of terrain common to North America. Trends and future projections are examined from an operations engineering point of view.

Contributed by the Rail Transportation Division of ASME for presentation at the IEEE-ASME Joint Railroad Conference, St. Paul, Minnesota, April 11-13, 1978.

Blaine, DG Grejda, FJ Kahr, JC (Westinghouse Air Brake Company)

American Society of Mechanical Engineers Conf Paper 78-RT-9, 1978, 20 pp, 22 Fig., 7 Tab., 9 Ref.

ACKNOWLEDGMENT: ASME

ORDER FROM: ESL

DOTL RP

05 178530

**RAILWAY BRAKING PERFORMANCE ON GRADIENTS**

In his capacity as an adviser to a South American railway, one of the two authors had the opportunity of getting a deep insight in the braking technique of mountain railways. This study has been worked out on the basis of the experience gained. According to the authors, the braking performance specification issued by the railways must meet certain fundamental requirements. The study proves that these requirements are not satisfactorily fulfilled on the South American Andes Railways where the UIC operating conditions (also steep downgrades, relatively short trains) are unfortunately combined with the AAR brake system (lightly braked freight trains, direct release air brake subject to depletion). Existing conditions on UIC railways are satisfactory, and the present valid prescriptions by UIC with respect to the minimum brake percentages of the trains are fully correct. The authors suggest the application of the specific energy method as a new procedure for checking the brake tables. [German]

Heller, G Vajda, J *Glaser's Annalen ZEV* Vol. 102 No. 2, Feb. 1978, pp 45-52

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

05 178549

**WHEELSLIP AND APT**

To develop the braking rates required by the high-speed Advanced Passenger Train of British Railways, wheelside protection is essential not only to protect wheels but to optimize adhesion. An analogy between gear-tooth scuffing and limits of adhesion has been developed. The factors leading to wheel slide, the period in which such adhesion changes take place and the response of a control system to such actions are all examined.

Murray, CL (British Railways Technical Center) *Railway Engineer* Vol. 3 No. 2, Mar. 1978, pp 22-27, 7 Fig., 6 Ref., 1 App.

ORDER FROM: ESL

DOTL JC

05 178690

**THE NEW KED CONTROL VALVE FROM KNORR-BREMSE****[KEd-Das neue Steuerventil der Knorr-Bremse]**

In autumn 1976 the new development of a graduated-brake control valve from Knorr-Bremse GmbH, the KEd control valve, was presented to the UIC sub-committee for brakes. The article describes its functional and constructional features and the improvements compared with the KEa and KEc control valves introduced in 1953-56. The newly developed accelerator control results in high pulse transmission speeds, even in braking with not yet completely released brakes. The altered charge characteristic of the storage air tank reduces the release time on long trains, and owing to the new design of the maximum pressure limiter the control-valve characteristics are independent of the pressure in the storage air tank. The KEd control valve, which is designed for inspection intervals of up to twelve years, is manufactured in both aluminum and cast iron. The article also describes the stationary and running with the UIC rules. The control valve was accepted

for international use by the UIC brakes sub-committee with effect from January 1, 1977. [German]

Braun, A. Kubath, G. *Eisenbahntechnische Rundschau* Apr. 1978, 5 pp, 9 Fig., 2 Ref.

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

06 053271

**USE OF ELECTRONIC COMPONENTS IN SIGNALLING. AN INFORMATION LEAFLET ABOUT THE SAFETY CONDITIONS TO BE FULFILLED WHEN USING ELECTRONIC COMPONENTS IN SIGNALLING**

This report contains an information leaflet summarising the ideas developed in the reports issued by the ORE Committee A 118.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways A 118/RP 13, Oct. 1977, 19 pp, 1 App.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

06 053275

**USE OF ELECTRONIC COMPONENTS IN SIGNALLING. PROCEDURES FOR THE SAFE DISPLAY OF INFORMATION ON COLOUR VIDEO DISPLAY UNITS FOR COMPUTER SYSTEMS**

This report contains a comparison of different suggested solutions to the problem of the safe display of information originating from computing systems, using colour video display units (VDUs).

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways A 118/RP 12, Oct. 1977, 47 pp, 7 Fig.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

06 053281

**USE OF ELECTRONIC COMPONENTS IN SIGNALLING. HOW CAN SAFETY BE GUARANTEED BY MEANS OF ELECTRONIC PROCESS COMPUTERS USED IN SIGNALLING TECHNIQUES?-INTRODUCTION AND DEFINITION OF PROBLEMS**

The report deals, in the form of an introduction, with problems related to guaranteeing safety when electronic process computers are used in signalling.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways A 118/RP 9, Apr. 1975, 23 pp, 6 Fig.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

06 169105

**TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME III. CONTRIBUTIONS OF TELECOMMUNICATIONS TO IMPROVED TRANSPORTATION SYSTEM EFFICIENCY**

Telecommunications expenses constitute a small fraction (about 2%) of the monies paid out by the transportation industry; however, the role of telecommunications is vital in providing for safe and efficient operation. This report describes the way that telecommunications are used in the transportation industry by sectors, including pipelines, railroads, motor trucking, aviation, and urban transportation. Proposals for increased use of telecommunications are also examined and evaluated. The conclusions of the report are that there are several significant new applications for telecommunications to support transportation activities, but that the importance of telecommunications in terms of fraction of transportation expenses will not dramatically increase. Economically justified proposals for new applications will require an investment of about \$3 billion over the next 20 years. This is less than the expected investment in current technology over the same period. The justifications for increased use of telecommunications are reduction in personnel needed to operate systems, by use of communications in automation; reductions in the need for equipment, primarily vehicles, through more efficient management of assets; and substitution of telecommunications investment for investment in construction to increase capacity of highways, railways, and airways. The authors find that such a substitution will usually result in a savings of scarce material resources without the environmental and social distribution that would result from the construction.

See also PB-272693-SET/ST, RRIS 15 169108; RRIS Bulletin 7802.

Moon, AE Johnson, JM Meko, EP, II Proctor, HS Feinstein, CD  
Stanford Research Institute, National Science Foundation, (SRI-4293)  
Final Rpt. NSF/RA-770159, May 1977, 127 pp

Contract NSF-C1025

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272696/6ST

06 172009

**ANALYSIS OF THE FAILURE RATE OF ELECTRONIC SWITCHES AND EQUIPMENT WITH A SAFETY FUNCTION [Analyse des Ausfallverhaltens elektronischer Schaltungen und Gerate mit Sicherheitsverantwortung]**

Description of various methods for analysing the working and failures of complicated safety systems, and examples of the consequence study method applied to individual systems: impulse transmitter frequency control equipment, integrated fail-safe circuit. [German]

Gossner, S *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 791-798, 8 Fig., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

06 172016

**SIGNALLING...WITHOUT POLE LINES?**

As microwave eliminates pole lines, railroad signal departments are confronted with alternatives to their control circuits formerly carried on poles along with communications circuits. Alternatives include buried cable, coded track circuits and audio frequency track circuits. Outside factors may dictate that all, or combinations of any two of these, may have to be utilized for specific applications. The problem as applied to a specific track segment was the subject of a panel discussion at the AAR Communication and Signal Section meeting in 1977.

*Progressive Railroading* Vol. 21 No. 1, Jan. 1978, pp 54-56

ACKNOWLEDGMENT: Progressive Railroading

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

06 172017

**OPTICAL-FIBER TRANSMISSION IN RAILROAD FUTURE?**

Optical-fiber cables, in place of metallic conductors, offer the possibility of low transmission loss and immunity to external electrical interference. There is no radiation or interwire coupling, and a lower weight and smaller size than conventional cables. For data transmission it is reported that there is a considerable reduction in error rate over metallic conductors. The glass filaments send signals as pulses of light.

*Progressive Railroading* Vol. 21 No. 1, Jan. 1978, p 56

ACKNOWLEDGMENT: Progressive Railroading

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

06 172657

**PRINCIPLE OF A TRACK SWITCH EQUIPMENT OPERATED WITHOUT CONTACT BY THE PREMAGNETISATION OF AN INDUCTION COIL [Konzipierung eines kontaktlos arbeitenden Gleisschaltmittels auf der Grundlage einer vormagnetisierten Drosselspule]**

The article recalls the drawbacks of the conventional mechanical pedal, especially for operating axle counters, and then explains the theory of magnetic control by means of a circuit in which an acoustic frequency generator, a resistance and an induction coil are mounted in series. The control action is effected when the permeability of the induction coil is changed by the field of a permanent magnet of which the magnetic circuit is closed when wheel flanges pass over it. [German]

Puschendorf, H *Signal und Schiene* Vol. 21 No. 9, Sept. 1977, pp 306-308, 5 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

06 172664

## HOW CURRENT MAINTENANCE CAN PREVENT SIGNAL LAMP FAILURE [Erhaltung der Funktionstuechtigkeit von Lichtsignalanlagen durch Instandhaltung]

Degree of reliability of German Federal Railway signal lamps deduced from observation of their performance and proposed introduction of a preventive maintenance system in which the lamps are changed on reaching the limit of their prescribed service life. [German]

Fischer, K Hultsch, K *Signal und Schiene* Vol. 21 No. 9, Sept. 1977, pp 301-305, 5 Fig., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

06 173145

## MODERN TELECOMMUNICATION INSTALLATIONS ON THE BERNE-LOTSCHBERG-SIMPLON LINE [Moderne Fernmeldekabelanlagen fuer die Bern-Loetschberg-Simplon-Linie]

In conjunction with the introduction of locomotives with thyristors, the Thun-Brig line has been equipped with a new telecommunications installation. The 3-layer cable sheath has extremely good diversity co-efficients, especially as far as the frequency of the spoken word is concerned. The earth of the telephone circuits differs in that it has a high degree of symmetry, and the circuits were improved when the cables were mounted by implementing optimum balancing measures. [German]

Schnuerlein, F *Bulletin SEV/VSE* Vol. 69 No. 2, 1978, pp 49-54, 4 Tab., 11 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schweizerischer Elektrotechnischer Verein, Seefeldstrasse 301, Postfach, 8034 Zurich, Switzerland

06 173164

## SOURCES AND LEVELS OF RADIO INTERFERENCE IN A RAILROAD SYSTEM [Zrodia i poziomy zaklacen radioelektrycznych w resorcie kolejnictwa]

Problems concerning the measurements of radio interference produced by the equipment operating within the Polish railroad system are discussed against the background of general methods. The electric and diesel-electric rolling stock, the supply substations, traction network and signaling equipment have been tested for interference generation. It has been found that locomotives and electric equipment represent the biggest "hazard" [Polish]

Laskowski, M Markowski, R *Przegląd Elektrotechniczny* Vol. 53 No. 3, Mar. 1977, pp 121-124, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 173374

## THE SUN SHINES (AND WORKS) ON THE SOUTHERN

Following its powering of grade crossing protection with Solar cells Southern Railway has now utilized the concept for mainline signaling and track circuits. Cost savings are found where ac power or primary batteries are expensive.

*Progressive Railroadng* Vol. 21 No. 3, Mar. 1978, 2 pp, 2 Phot.

ACKNOWLEDGMENT: Progressive Railroadng  
ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

06 173379

## THE LIFELINE OF CONTROL, COMMUNICATION AND POWER. 1 CABLES. 2 CABLE ROUTES.

Reviews the developments in cables from their early beginnings to the present, including cables to combat fire hazards, track to train communications and optical fibers. In part 2, the importance of the protection provided by the cable route is stressed.

Advance Paper presented to the Institution of Railway Signal Engineers.

Curtis, RA Hesketh, B  
Institution of Railway Signal Engineers Dec. 1977, 20 pp, 2 Fig., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Institution of Railway Signal Engineers, 1 Ashbourne Close, London W5, England

06 173395

## PROTECTION OF TRACK CIRCUITS AGAINST THE ACTION OF ELECTRIC HEATING BY DIESEL TRACTION [Schutz der Gleisstromkreise gegen Einwirkungen der elektrischen Zugheizung bei der Dieseltraktion]

No Abstract. [German]

Nadvornik, B Stoll, K *Zeitschrift der OSShD* Vol. 20 No. 5-6, 1977, pp 9-12, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Railway Cooperation Organization (OSShD), Hoza 63/67, Warsaw, Poland

06 173418

## PROCEEDINGS OF THE 11TH MEETING OF THE SCIENTIFIC COMMITTEE FOR TRACK AND OPERATIONS HELD IN BRUNSWICK ON 9 AND 10 MARCH 1977 ON RECENT KNOWLEDGE STEMMING FROM THE THEORY OF AUTOMATIC CONTROL OF TRAIN-RUNNING APPLIED IN PRACTICE [Niederschrift ueber die 11. Sitzung des Wissenschaftlichen Ausschusses fuer Bau-und Betriebstechnik (WAAB) am 9. und 10. Maerz 1977 in Braunschweig: Neuere Erkenntnisse aus der Theorie des Linienleiters fuer die Praxis]

No Abstract. [German]

Fricke, H Selle, D  
German Federal Railway DB: Dok 4663, 1977, 12 pp, 14 Phot., 24 Ref., 31 App.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: German Federal Railway, Friedrich-Ebert-Anlage 43-44, 6 Frankfurt am Main, West Germany

06 173430

## EFFECTS OF ELECTROMOTIVE FORCES INDUCED BY ELECTRIC TRACTION LINES IN RAILWAY TELEPHONE WIRES [Efectos de las fuerzas electromotrices inducidas por las lineas de traccion electrica en los cables telefonicos ferroviarios]

The author follows a detailed account of the subject by offering the following solutions aimed at reducing induction effects: by ensuring the wires are adequately protected, equipping locomotives and power supply sub-stations with the appropriate filters, and by correcting capacity imbalances when the telephone links are being set up, by earthing the quad pairs of the wire so as to counteract the transverse voltage induced. [Spanish]

Alonso, JA *AIT-Revista* No. 18, Oct. 1977, pp 9-16, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Madrid, Spain

06 173436

## REVERSIBLE SIGNALLING AS SUPPLIED ON THE WESTERN REGION BETWEEN DIDCOT AND BRISTOL

Outlines the need for reversible working over long sections of a double line railway following the introduction of high-speed services. The possible solutions are considered and the final arrangements detailed with reference to the problems, including the safety of staff working on the track, which had to be resolved.

Openshaw, VK  
Institution of Railway Signal Engineers Jan. 1978, 12 pp, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Institution of Railway Signal Engineers, 1 Ashbourne Close, London W5, England

06 173440

## CARRIER FREQUENCY DATA TRANSMISSION THROUGH A 150 KV LINE. OPERATING PROBLEMS AS A RESULT OF REPLACEMENT OF A SECTION OF OVERHEAD LINE BY A CROSS-SHEATH CABLE [Traegerfrequente Nachrichtenuebertragung ueber eine 150-kV-Leitung. Betriebsprobleme beim Ersatz eines Freileitungsabschnittes durch ein Kabel mit ausgekreuzten Maenteln]

No Abstract. [German]

Thalmann, K *Bulletin SEV/VSE* Vol. 69 No. 2, 1978, pp 55-56, 4 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Schweizerischer Elektrotechnischer Verein, Seefeldstrasse  
 301, Postfach, 8034 Zurich, Switzerland

## 06 173441

**EXPERIMENTS WITH AN AUTOMATIC DRIVING SYSTEM ON  
 A SERIES 111 ELECTRIC TRACTIVE UNIT [Automatische Fahr-und  
 Bremssteuerung Erprobung auf einer elektrischen Lokomotive der  
 Baureihe 111]**

Description of the AFB automatic driving system tested on a DB series 111 electric locomotive. This system is programmed according to theoretical values for the speed and load of the train, and is intended to function under continuous automatic control while the train is running. [German]

Krueger, G Bohms, H *Elektrische Bahnen* Vol. 48 No. 11, 1977, pp 275-278, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: ESL

DOTL JC

## 06 173442

**THE SPM DEVICE FOR INTERLOCKING SIGNALS AT  
 MANNED LEVEL CROSSINGS [Das SpM 76-Einheitsgeraet zur  
 Herstellung der Signalabhaengigkeit bei waerterbedienten Schranken]**

The author first describes the functioning of manned level crossings equipped with the SpM interlocking and announcing device, and then describes the structure and operational features of the SpM 76 device modules, explaining the various connections with the aid of basic diagrams. [German]

Sohu, E *Signal und Draht* Vol. 69 No. 11, 1977, pp 259-271, 19 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

## 06 173577

**PROGRESS IN OPTICAL FIBER TRANSMISSION  
 TECHNOLOGY**

Research activities on optical fiber transmission technology in Japan are reviewed. Extremely low loss properties have been found in step-index multimode and single mode fibers at longer wavelengths, such as 1.2 millimicrons and 1.5 millimicrons. A perturbation theory was successfully adapted to analyzing the transmission characteristics of multimode fibers. Improvement in GaAlAs laser diode lifetime is in progress & oscillation mode selection has been studied to achieve better diode characteristics. Semiconductor and lithium-neodymium-tetraphosphate lasers operating at the longer wavelengths, fiber splicing and connectors and repeaters are also reviewed.

Shimada, S (Japan Telegraph & Telephone Public Corporation);  
 Koyama, M Kimura, T *Japan Telecommunications Review* Vol. 19  
 No. 2, Apr. 1977, pp 86-96, 33 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: Telecommunications Association, New Yurakucho Building,  
 1-11 Yurakucho, Chiyado-ku, Tokyo 100, Japan

## 06 173787

**MAN-MACHINE COMMUNICATION SYSTEM FOR  
 TRANSPORT CONTROL: TRIP**

An on-line computer-aided man-man communication system for train regulation is proposed here. Additional delay due to queuing of trains is derived. Two kinds of performance measures for train regulation are related to additional delay. Based on each measure, either of two different functions for train regulation is assigned to each dispatcher. By computer-aided communication among dispatchers, they can coordinate their own measures and then regulate trains.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference,  
 April 11-13, 1978, St. Paul, Minnesota.

Mori, K Tsuboi, A Ihara, H (Hitachi Limited)  
 Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8  
 IA, 1978, pp 41-46, 8 Fig., 5 Ref.

ACKNOWLEDGMENT: IEEE  
 ORDER FROM: ESL

DOTL RP

## 06 173790

**COMPUTER CONTROLLED DISPATCHING SYSTEMS**

It has been half a century since the installation of the world's first centralized traffic control system for railroads that permitted one train dispatcher to control operations of trains in a territory, without the use of train orders or a time-table. Over the years, the system has evolved into today's computerized, color video display system whereby one dispatcher efficiently controls a section of tracks or even an entire railway. This paper traces the evolution of centralized traffic control.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference,  
 April 11-13, 1978, St. Paul, Minnesota.

Means, JB (General Railway Signal Company)  
 Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8  
 IA, 1978, pp 22-24

ACKNOWLEDGMENT: IEEE  
 ORDER FROM: ESL

DOTL RP

## 06 173791

**ELECTROMAGNETIC INTERFERENCE IMPACT ON RAILROAD  
 CLASSIFICATION YARDS**

The electromagnetic environment in classification yards has become more complex due to the widespread application of electrical and electronic systems and is characterized by the transients of collapsing electrical fields of heavy equipment such as switch machines, retarders and traction equipment. Such noise levels affect the low level signals used for control, signaling and communications, particularly those utilized in automation and for data processing. FRA has sponsored a project to identify this environment and its preliminary results are reported.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference,  
 April 11-13, 1978, St. Paul, Minnesota.

Cracker, WF, Jr (Federal Railroad Administration); Speh, PE  
 (Electromagnetic Compatibility Analysis Center)  
 Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8  
 IA, 1978, pp 18-21, 8 Fig.

ACKNOWLEDGMENT: IEEE  
 ORDER FROM: ESL

DOTL RP

## 06 173792

**FRA RESEARCH FOR THE DEVELOPMENT OF A UNIVERSAL  
 SIGNAL AND TRAIN CONTROL SYSTEM FOR U.S.  
 RAILROADS--A PROGRESS REPORT**

For the first time in 150 years of the U.S. Railroad Industry nationwide train operations are performed by one corporation: AMTRAK. The success of the system will depend on many factors which have not been previously considered. One is signaling and train control. FRA has initiated a study of new technology and standardization in this field. The assessment is the first step toward the development of a universal signal/train control system. It is intended that the system will strengthen the efficiency and competitive strength of intercity rail passenger service.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference,  
 April 11-13, 1978, St. Paul, Minnesota.

Taylor, SF (STV, Incorporated)  
 Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8  
 IA, 1978, pp 14-17

ACKNOWLEDGMENT: IEEE  
 ORDER FROM: ESL

DOTL RP

## 06 173794

**COMPATIBILITY OF SIGNALING WITH A.C. PHASE  
 CONTROLLED MOTIVE POWER**

This paper describes the basic considerations regarding interference susceptibility of both wayside and trainborn signaling systems. The fundamental mechanisms which cause noise signals to be coupled from the traction power system to the signaling systems are defined with particular emphasis on the effects of harmonics of traction power. The behaviour of the signaling systems is considered for both normal and abnormal conditions. Finally, the entire subject will be calibrated using quantitative data obtained from a series of tests using an E60CP locomotive in actual operation.

Presented at the 1978 Joint ASME and IEEE Railroad Conference, April  
 12, 1978 by Anthony G. Ehrlich.

Stark, DE

Westinghouse Air Brake Company Tech Pap. 1978, 45 pp, Figs.

ACKNOWLEDGMENT: Westinghouse Air Brake Company

ORDER FROM: Westinghouse Air Brake Company, Union Switch and Signal Division, Pittsburgh, Pennsylvania, ESL

DOTL RP

06 173797

## OPERATING CONTROL CENTRES ON THE DB

The operating control centres on the German Federal Railway automate and centralize the functions of the traffic superintendent in the signal boxes at the local levels. The process control takes place in Munich and Saarbrücken in two computer operations: in the event of failure of one computer, in the reliable single computer service. All routes are adjusted to the optimum timing by the computer. Conflicts with the other routes are detected in good time and the traffic superintendent at the control centre is informed, who can then arrange accordingly. The operating room of the traffic superintendent has only an alpha-numerical input and output keyboard and five monitors as working equipment. Further stages of automation lead to a tracking of the train running with nominal/actual comparison as well as the automatic issuing of information to the passengers. With the use of micro-processors there is the possibility in the future of decentralizing the process, whereby the availability will be increased.

Kalusa, M (German Federal Railway) *Rail International* Vol. 9 No. 1, Jan. 1978, pp 19-30, 11 Fig.

ORDER FROM: ESL

DOTL JC

06 174381

## VERSAILLES RESIGNALING

Owing to its special operating features (based on computer-stored train sequence) and its technology (data processing equipment) the Versailles-Chantiers signalbox represents a major innovation in France, and a test as well.

Paper presented to the Institution of Railway Signal Engineers (London), February 17, 1978.

Retiveau, R Catrain, J

Institution of Railway Signal Engineers 1978, 16 pp, 13 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Institution of Railway Signal Engineers, 1 Ashbourne Close, London W5, England

06 174384

## COMPUTER AIDED CENTRALISED TRAFFIC CONTROL ON SOUTH AFRICAN RAILWAYS

Reasons, involving efficiency and manpower saving, are outlined for the development of Centralised Traffic Control (CTC) on South African Railways toward computer-based systems. The general operational facilities of computer-aided CTC are discussed, followed by the specific control areas, hardware configuration, and back-up philosophy, for the first implementation. Software for this project, as well as system development and proposed system maintenance, is covered broadly. Future computer applications in this field are listed.

Grisdale, B (South African Railways) *South African Inst of Elec Engineers Transactions* Vol. 68 Part 11, Nov. 1977, pp 270-283, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

06 174390

## L&N'S STRAWBERRY YARD: WHAT MAKES IT RUN

Communication and signaling system of the Family Lines System's Louisville & Nashville, at Louisville, Ky. is described. The new yard occupies 357 acres on the southside of Louisville, and replaces five smaller flat classification yards which formerly served the area. It differs from other Family Lines Yards, and even from those of most other railroads, in that it is designed both to handle through trains and to serve as a large originating yard for about 350 area industrial shippers.

Ellsworth, KG *Railway Age* Vol. 179 No. 3, Feb. 1978, pp 16-18

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

06 175255

## SURVEY OF INDUCTIVE COMMUNICATION SYSTEMS

A survey is made of various inductive systems proposed for low frequency train communication. It is found that thick dielectric jackets or coaxial and metallic shields may be required to reduce the environmental effects that lead to high attenuation. Twisted wire cables with inversely connected coupling antennas attain reduction of induced electrical noise and of radiated fields. External noise interference in various environments is discussed. Analysis is made of the coupling variation effect due to wire separation.

Chin, GY Yoh, P

Transportation Systems Center, Federal Railroad Administration Intrm Rpt. DOT-TSC-FRA-74-13, FRA-ORD&D-75-35, Apr. 1975, 60 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276189/8ST, DOTL NTIS

06 176664

## GUIDED RADAR FOR RAILWAY OBSTACLE DETECTION

This report describes experimental work performed at Queen's University to evaluate the application of a Guided Radar Information Processing System for detecting earthslides, mudslides, rockslides and other obstacles on a railway track. It was demonstrated that the technique is feasible for the detection of small rock obstacles, and extrapolated data indicates that the system will be effective for other obstacles as well. Experiments conducted with the Guided Radar System demonstrated that rock obstacles can be detected using a continuous wave mode, with its simplicity of both hardware and software. Rocks of diameter greater than 25 cm were detected with the system. Human and animal targets were also detected, the latter case giving rise to the possibility of nuisance alarms. Experiments showed that sensitivity decreased with distance down the cable due to attenuation, and it is recommended that a graded cable be employed to circumvent this problem. Future work suggested for an operational system would be an investigation of the effects of mud and earth slides on the system, environmental effects on sensitivity, an investigation of an optimum frequency of operation, and the type of cable used, their position on the rail bed and their length. It was also recommended that future investigations be conducted in an operational environment to enable a realistic comparison with contemporary techniques. It is concluded from this program that the guided radar technique is feasible in a track obstacle detection application. There are a number of advantages appropriate to the railway environment which lend themselves to simplicity of operation and to greater rail safety.

Mackay, NA Benjamin, A

Canadian Institute of Guided Ground Transport Final Rpt. CIGGT-78-3, Nov. 1977, 25 pp, 17 Fig.

ACKNOWLEDGMENT: CIGGT

ORDER FROM: CIGGT

DOTL RP

06 176669

## OPTICAL AUTOMATIC CAR IDENTIFICATION (OACI). READABILITY AND SCANNER PERFORMANCE

The results of the Optical Automatic Car Identification (OACI) study on readability and scanner performance conducted on the Chicago Railroad Terminal Information System (CRTIS) data which includes operation from February 1 to June 15, 1977 are presented. The main purpose of this study was to determine the scanner non-read and error-read contributions to overall OACI readability measurements, the use of the calibration train concept as a method of OACI network analysis, and possible network automatic checkout. The study attempts to separate the non-read and error-read components due to the scanner performance from other label factors which affect the readability measurements. The scanner performance contribution to non-read and error-reads was estimated on the basis of scanner readability differences observed by means of calibration trains. The calibration train concept is suggested as an effective tool to evaluate OACI scanner network performance. The present study complements the one conducted in 1975 by the Federal Railroad Administration (Final Report No. FRA/ORD-76/249, May 1976). Conclusions are presented.

This is one of four reports which provides the final reports for the FRA OACI Improvement Effort. Consistent with the four interim reports (Report No. FRA/ORD-77/38), the other final reports (to be published) will cover the subjects of: Scanner System Performance and Cost Improvements (78/15.I); Optical Properties of Labels (78/15.III); System Alternatives Evaluation Model (78/15.IV).

Ingrao, HC Thompson, WI, III  
Cambridge Systems Corporation FRA/ORD-78/15.II, Mar. 1978, 221  
pp, Figs., 6 Tab., 15 Ref., 5 App.  
Contract DOT-FR-74292

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-280550/AS, DOTL NTIS, DOTL RP

06 176676

**INTRODUCTION OF THE F70 REMOTE CONTROL SYSTEM ON THE WERTAL RAILWAY [Der Ersteinatz der Fernsteuerung F70 auf der Wertalbahn]**

In May 1977, the F70 electronic remote control system, on which experiments had been carried out by the DB Central Office, was brought into service on the Wertal-Railway lines in the Wurzburg region. Description of the system, how it works and maintenance of the equipment. [German]

Baumgaertel, HD Petersen, K *Signal und Draht* No. 12, 1977, pp 279-288, 17 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

06 176694

**PETRI NETWORKS IN RAILWAY SIGNALLING TECHNIQUES [Petri-Netze in der Eisenbahnsignaltechnik]**

To solve the extensive problems of railway signalling techniques, with the Petri networks method a model of functions by graphs, consisting of processes operating in parallel, is developed. Each of these processes is re-used as a situation graph by incorporating the opposite effect of change. Complementary decision tables containing the same information make it possible to complement the data of the situation graphs, if necessary, with other particulars. [German]

Gottschalk, W *Siemens Review* Vol. 51 No. 11, 1977, pp 876-879, 1 Tab., 3 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

06 176713

**DESIGN AND IMPLEMENTATION OF PROCESS COMPUTER CONTROL IN THE MASCHEN MARSHALLING YARD [Die Prozesssteuerung des rangierbahnhofs Maschen, Planung und Ausfuehrung]**

The Maschen marshalling yard which, when completed in 1980, will be the largest and most modern in Europe is fitted with computers that will control all shunting operations. The article describes how the system works. It cuts down what staff have to do and means that train splitting and formation operations can be automated. [German]

Euler, L *Elektrische Bahnen* No. 12, 1977, pp 294-301, 8 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

06 176870

**STATISTICAL INVESTIGATIONS OF RADIOELECTRIC INTERFERENCES CAUSED BY ELECTRIC TRACTION VEHICLES [Badania statystyczne zakloen radioelektrycznych przez pojazdy trakcji elektrycznej]**

Results are presented of a statistical investigation of radioelectric interferences caused by electric traction vehicles. The investigation was primarily concerned with Polish Eu-07 type electric locomotives and En-57 type traction units. [Polish]

Markowski, R *Przegląd Elektrotechniczny* Vol. 33 No. 4, 1977, pp 169-171, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 176905

**AUTOMATIC CONTROL OF TRACKBOUND VEHICLES**

A system for the automatic control of trackbound vehicles has been developed. A control center monitors actual and permissible vehicle speed.

If actual speed exceeds a certain level, emergency braking is automatically begun. Braking is also initiated if a stopping point is overshoot. Computer synchronization is performed by a technique of interrupts and takes place at the beginning of each program. Data are exchanged between vehicle and control center by a telegram format. The telegram may have a length of 83.5 bits and a transmission speed of 1200 Bd. The closed circuit principle is used to ensure fail-safe emergency braking. Activation by the processing system is performed by two channels through which the emergency brakes are independently activated.

Uebel, H (Standard Elektrik Lorenz AG, West Germany) *Electrical Communication* Vol. 52 No. 4, 1977, pp 279-282, 5 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: ESL

06 177033

**D&RGW CONSOLIDATES CTC... WITH A STRONG ASSIST BY TELECOMMUNICATIONS**

Denver & Rio Grande Western has consolidated dispatching at four CTC consoles in a Traffic Management Center in downtown Denver. The entire 1800-miles of railroad is controlled from this single point with a microwave linkup that involves voice and data communication, connection with the railroad's computer and monitoring equipment to assure the full-time integrity of the system.

*Progressive Railroadng* Vol. 21 No. 5, May 1978, 4 pp, 5 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

06 177158

**TELEPHONE EQUIPMENT FOR SAO PAULO'S SUBWAY SYSTEM**

This article describes the telephone systems used in the administrative and train control networks of the Sao Paulo (Brazil) subway, the first section of which went into service in September 1975. The subway is being equipped with an up-to-date communications system which has been designed for greater efficiency and operational reliability.

Goncalves, M (Siemens, Brazil) *Telefon Report* Vol. 13 No. 1, Sept. 1977, pp 44-47

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 177185

**DEVELOPING INTEGRATED URBAN TRANSPORTATION CONTROL SYSTEMS**

This paper discusses urban transportation control practices in North America and European cities as guides to developing more integrated urban transportation control systems in our cities. Strategic control functions, tactical control functions, field control functions, information flow, improvement and development potential are highlighted.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Catton, FD (IBI Group); Irwin, NA

Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-IA, 1977, pp 946-952

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

06 178155

**TYPE 200E TELEPHONE SYSTEM FOR PUBLIC TRANSPORT ORGANIZATIONS**

The type 200E telephone system offers flexible and economic solutions for the expansion of private communications networks for railways, inland waterways, highway departments and other public transport organizations. Using established ESK modules, a line of telephone systems for between 30 and 200 extensions have been created allowing local and long-haul dialing in the private networks of public transport organizations.

Franzen, D *Siemens Review* Vol. 44 No. 8, Aug. 1977, pp 372-376

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL



06 178278

## ANALYSIS OF CURRENT HARMONICS PRODUCED BY THE CHOPPER [Análisis de los armónicos de corriente producidos por el chopper]

The article is a contribution towards greater knowledge of problems that the use of choppers creates in respect to signalling and telecommunications installations. [Spanish]

Munarriz, MA *AIT-Revista* No. 19, Dec. 1977, pp 25-38, 7 Fig., 1 Tab., 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

06 178291

## SIGNAL TRAINING: HOW RAILROADS AND THE UNION COOPERATE

Staff requirements in the signal training sphere are quite considerable in the U.S. and Canada. This article describes the various subjects covered during these training courses, and argues the case for closer cooperation between railroads and the union, Brotherhood of Railway Signalmen.

McKnight, RW *Railway Age* Vol. 179 No. 3, Feb. 1978, pp 26-28

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

06 178428

## MOVEMENT DYNAMICS AND SAFETY OF RAILWAY VEHICLES WITH SPACING CONTROL [Fahrdynamik und Sicherung Laengsgeregelter Schienenfahrzeuge]

The author firstly explains the synchronous and asynchronous control of vehicles as well as the possibilities of automatic regulation of movements and spacing. He goes on to describe, using railway examples, spacing system incorporating train spacing, shows the hierarchical structure with special emphasis on the minimum amount of train-track communications, made possible by the optimum distribution of "safety" and "control" functions between train and track. [German]

Glimm, J *Schienen der Welt* No. 2, Feb. 1978, pp 80-101, 23 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schienen der Welt, Brussels, Belgium

06 178432

## COMPUTER AIDED PRODUCTION OF SIGNALLING CONTROL TABLES. ADVANCE REPORT

Outlines the development of control tables and describes the operation of a computer program named "DAISIE" (Design Aid for Signal Engineers) which has been produced to assist in their compilation. The use of the program is described and possible areas of further development are indicated.

Brown, V Haberlin, AH  
Institution of Railway Signal Engineers Mar. 1978, 19 pp

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Institution of Railway Signal Engineers, 1 Ashbourne Close, London W5, England

06 178440

## FS "DIRETTISSIMA" HIGH-SPEED LINE SIGNALLED FOR 250 KM/H

A two-aspect signalled route arranged for fully-reversible working with continuous cab signalling and coded track-circuit automatic blocks upon which is superimposed an additional channel for automatic emergency braking.

Pezzi, P *Railway Engineer* Vol. 3 No. 2, Mar. 1978, pp 9-12, 6 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

06 178527

## SPEED INPUT AND CONTROL FOR AUTOMATICALLY CONTROLLED RAIL VEHICLES

The author describes the method of the speed input for vehicles such as employed in the SELTRAC system, and also the controller structures used

in the vehicle computers. As typical example of the arrangement, the equipment of the Berlin Transport Authority's Type A3L is described. [German]

Uebel, H *Eisenbahntechnische Rundschau* Vol. 27 No. 1-2, Jan. 1978, 3 pp

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

06 178689

## AUTOMATIC CAR IDENTIFICATION AT THE HANSAPORT HAMBURG BULK-FREIGHT TERMINAL [Einsatz einer automatischen Wagenerkennung bei der Massengutumschlaganlage HANSAPORT]

One of the main functions of the Hansaport bulk-freight terminal in Hamburg is the automated transshipment of bulk cargoes brought by sea-going ships, with intermediate storage, into small cargo parcels for onward movement by inland transport. Freight costs are kept low by using merry-go-round block trains. Wagon numbers and sequence are recorded upon the arrival of a train by a Siemens SICARID-ACI 500 automatic identification system, so that loading can proceed shortly afterwards in accordance with the programme set up in the central computer. Automatic vehicle identification saves much time and is also more reliable than the manual method hitherto used. [German]

Thomas, E Linhardt, W *Eisenbahntechnische Rundschau* Apr. 1978, pp 219-221, 2 Fig., 7 Ref.

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

06 178908

## CABLE PCM SYSTEM FOR RAILWAY COMMUNICATIONS

The PCM system applied to telecommunications circuits of JNR is described. To use such a system between major points, it is necessary to have the ability to drop and insert channels at intermediate stations and to have repeaters spaced at 5-km intervals. To meet such requirements new equipment and cable were developed. A new method for evaluating transmission quality of the PCM system was developed. PCM is applied to circuits of less than 100 km with 12 to 24 channels.

Kawase, S Saito, M Hisano, K *Railway Technical Research Inst. Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 15-19, 9 Fig., 1 Tab., 2 Ref.

ACKNOWLEDGMENT: Japanese National Railways  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

06 178915

## DEVELOPMENT OF OPERATION MOVEMENT AND CONTROL SYSTEMS [Entwicklung der Betriebsleit-und-steuersysteme]

The use of electronic data processing in signalling and communications has led to a large extent to the disappearance of previously recognizable dividing lines. In connection with the Integrated Transport Control System (ITS), the transport processes on the DB are being extensively automated by way of operation movement and control systems. In such compound man/machine systems, process computers take over the tasks of disposition and operation. [German]

Wegner, L *Eisenbahningenieur* May 1978, 5 pp, 5 Fig., 2 Tab., 9 Ref.

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

06 178927

## OPTICAL TRANSMISSION OF INFORMATION WITH GLASS FIBRES

The use of glass fibres for the optical transmission of information is still a relatively new technology, but it is nevertheless often said to be one of the future techniques for communications and signal transmission. The state of development is already so advanced that in several European countries test systems are in service or will go into operation within a year. The article reviews what has been achieved. After a description of some fundamentals, fields of application, glass fibre technology and systems are examined. The article concludes with instrumentation aspects, a table listing European test systems planned or in operation, and a look to the future. [German]

Burkhardt, R *Eisenbahntechnische Rundschau* Vol. 27 No. 3, Mar. 1978, 5 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

DOTL JC

06 178928

#### AN EXPERIMENTAL APPLICATION OF MICROPROCESSORS TO RAILWAY SIGNALLING

The Research & Development Division of British Rail is engaged in a programme of development which, it is hoped, will result in a microprocessor-based alternative to the electromechanical interlocking equipment used in present-day signalling systems. An alternative system must match the outstanding safety and reliability of present-day signalling technology, which has evolved over a long period of time.

Cribbens, AH Furniss, MJ Ryland, HA *Electronics and Power* Vol. 24 No. 3, Mar. 1978, pp 209-214

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

06 178929

#### THE RAILWAY TRACK AS INFORMATION STORE

No Abstract.

Kohler, H *Eisenbahntechnische Rundschau* Vol. 27 No. 3, Mar. 1978, pp 115-118

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

06 178947

#### TYNE & WEAR METRO DEFINES A CONTROL PHILOSOPHY

In 1979 8 km of Britain's first modern light rail system will commence operations in the northern suburbs of Newcastle-upon-Tyne. LRT practice in Germany and Belgium was the starting point in minimizing staff while keeping capital costs down. Although the 55-km network will be signaled throughout and stations will be monitored by CCTV from a central control room, routes will be set automatically through interlockings according to destination data derived from approaching trains.

Hamer, D *Railway Gazette International* Vol. 134 No. 6, June 1978, 5 pp, 2 Fig., 3 Phot.

ORDER FROM: ESL

DOTL JC

06 179065

#### HOW AUTOMATIC TRAIN CONTROL INCREASED MINE HAULAGE CAPACITY

Advanced, automatic railbound haulage systems are being introduced in several underground copper and coal mines in Poland. The most extensive experience with an automated rail haulage system has been collected at the Staszic coal mine near Katowice where the first such haulage level was installed. The article describes this installation and the successful results obtained.

*World Mining* Vol. 31 No. 2, Feb. 1978, pp 46-49

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

06 179117

#### OPTICAL AUTOMATIC CAR IDENTIFICATION VOLUME-IV--SYSTEM ALTERNATIVES EVALUATION MODEL

The report presents the development of an analytical model together with descriptions and illustration of how it can be applied in analyzing the comparative benefits and costs of using ACI to improve typical railroad operation and control management information systems (MIS). Summaries are made of background studies of how ACI has been employed by different railroads. The system implementations at these organizations were found to vary significantly. The basic measure of the overall MIS operational effectiveness is defined. Also the report identifies and discusses basic kinds of errors which can occur relating to car handling and clerical reporting. The ACI system is described and analytical (probabilistic) representations are made for characterizing the imperfect status and performance accuracies.

The report provides a qualitative discussion of the considerations underlying systematic integration of pre-car movement information produced by yard level operations with actual car movement reports produced by ACI to generate updated advance consist reports with enhanced accuracy. Four appendices covering the analytical development, procedures for applying (manual or computer) the model, and illustrations of model applications, are considered an integral part of model development.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This is one of four reports which provides the final reports for the FRA OACI Improvement Effort. Consistent with the four interim reports (Report No. FRA/ORD-77/38), the other final reports cover the subjects of: Scanner System Performance and Cost Improvements 78/15.I (to be published); Readability and Scanner Performance 78/15.II (March 1978); Optical Properties of Labels 78/15.II (to be published).

Kooharian, A

Kooharian (A) FRA/ORD-78/15.IV, May 1978, 99 pp, 5 Fig., 5 Tab., 2 Ref., 4 App.

Contract DOT-FR-74296

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-282488/AS, DOTL NTIS, DOTL RP

06 179143

#### INVESTIGATION OF THE RELIABILITY OF ELECTRONIC INFORMATION SYSTEMS ON MOTIVE POWER [Untersuchungen zur Zuverlässigkeit informationselektronischer Einrichtungen auf Triebfahrzeugen]

In the development of electronically controlled motive power units, operating safety and reliability are essential features. Through the observation of models, solutions are determined for the design, construction and testing of such installations. For this purpose, use is made of the possibilities offered by theoretical analysis of reliability in operation. As a result of the high standard of reliability of modern equipment, failure seldom occurs, and double failures can be ruled out. From the results obtained with motive power units fitted with these devices and already in service, the limit values for critical situations can be defined. The article refers to practical examples. [German]

Merkel, HH *Schienenfahrzeuge* Vol. 22 No. 1, 1978, pp 11-15, 2 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

06 179150

#### DEVELOPMENTS IN DETACHABLE ELECTRIC SIGNALS AT THE REAR OF TRAINS [Abnehmbares elektrisches Zugschlusssignal in Entwicklung]

No Abstract. [German]

Angerer *Eisenbahningenieur* Vol. 29 No. 4, 1978, pp 183-184, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

06 179158

#### TRENDS IN SIGNALLING AND TRAIN SAFETY

[Entwicklungstrend der Signalisierung und Zugsicherung auf Fernbahnen]

The author briefly describes the development of signalling systems and then explains his ideas on a new light signal system, signal combinations and possibilities for use. He gives details on solutions for when failures occur or work must be carried out and then explains the limitation of automatic controls for stopping trains. He compares the automatic control of train running with systems used in other railways and concludes with a list of the tasks to be accomplished placing emphasis on the essential problems which should be given priority. [German]

Wehner, L *Signal und Draht* Vol. 70 No. 1-2, 1978, pp 3-13, 11 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

07 117491

**RESEARCH LOCOMOTIVE AND TRAIN HANDLING EVALUATOR DEFINITION--CONCEPT 1**

No abstract available.

Set includes PB-276 363 thru PB-276 366.

MB Associates, Federal Railroad Administration 4 volumes, 1977, 682 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276362-SET/ST, DOTL NTIS

07 117495

**RESEARCH LOCOMOTIVE AND TRAIN HANDLING EVALUATOR DEFINITION -CONCEPT 1. VOLUME III. ESTIMATED COSTS**

Volume III describes the concept definition for a Research Locomotive and Train Handling Evaluator. Volume III presents cost estimates for designing, constructing and installing the Research Evaluator. Support facilities and buildings alongwith appropriate staffing are described but not costed. The Research Evaluator concept provides for growth from a basic facility to the full facility ultimately needed to carry out the FRA research program. Cost estimates are presented for both the basic, entry level facility and the ultimate facility.

See also Volume 2, PB-276 365. Also available in set of 4 reports PC E13, PB-276 362-SET.

Hulbert, S Wheeler, J Dompe, R Witham, C Csanky, L  
MB Associates, Federal Railroad Administration Final Rpt. FRA-  
/ORD-77/47-VOL-3, MB-R-77/25-VOL-3, Sept. 1977, 37 pp

Contract DOT-FR-64260

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276366/2ST, DOTL NTIS

07 139975

**REVIEW OF RIDE VIBRATION STANDARDS AND TOLERANCE CRITERIA**

This paper discusses standards and other criteria which deserve application to actual vehicle ride vibration data so that a better understanding of ride can be established in the near future.

Stikeleather, LF (Allis-Chalmers Manufacturing Company)  
Society of Automotive Engineers Preprint n 760413, Apr. 1976, 9 pp, 11 Ref.

ACKNOWLEDGMENT:

07 165243

**CRITICAL ASSESSMENT OF STUDIES RELATING WHOLE-BODY VIBRATION TO PASSENGER COMFORT**

This paper critically reviews the major work which has been carried out over the past 40 years to investigate the relationship between whole-body vibration and comfort. Although a fair amount of work has been completed in this area, this review demonstrates that the majority is unacceptable from most practical standpoints although some concordance exists. Finally, the paper shows that attempts which have been made to draw the field together (including an International Standard) to produce curves of equal comfort have not significantly increased our knowledge of how people react to whole-body vibration.

Oborne, DJ (Swansea University College, Wales) *Ergonomics* Vol. 19 No. 6, Nov. 1976, pp 751-774, 64 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

07 172008

**MAN/MACHINE INTERCORRELATION WITH REFERENCE TO TRAIN SAFETY SYSTEMS [Modelle des Zusammenwirkens von Mensch und Technik in Systemen zur Zugsicherung]**

No Abstract. [German]

Schwier, W *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 763-768, 11 Fig., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

07 172635

**FROM AIR FORCE BASE TO ENGINEER TRAINING CENTER**

Canadian National's locomotive engineer training center at Gimli, Man., has two full-scale simulators for instruction of trainees. The basic course is eight weeks but there are two-week refresher courses for those operating locomotives and other types of courses for various CN supervisors. More than 800 of CN's 3700 locomotive engineers have been trained at Gimli.

*Progressive Railroading* Vol. 21 No. 2, Feb. 1978, 3 pp, 5 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

07 173148

**PSYCHOLOGISTS LOOK FOR ACCIDENT LINK BETWEEN SKILL AND HUMAN ERROR**

A new technique is being advocated by psychologists to evaluate the probability of failure of a given task performed in the factory.

Beatson, C *Engineer* Vol. 246 No. 6357, Jan. 1978, 1 pp, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Morgan-Grampian Limited, 30 Calderwood Street, London SE18 6QH, England

DOTL JC

07 173396

**DRIVING SIMULATOR FOR THE TRAINING OF LOCOMOTIVES**

[Simulateur de conduite pour le perfectionnement du personnel de machines]

The development of automatic signal-repeater and speed control systems, as well as higher running speeds, have brought to light the problem of what new methods to use for training enginemen. A satisfactory solution, involving a cab simulator, has now been devised. This simulator offers such advantages that the FSS have ordered a prototype unit for use in training. The purpose of this article is to describe the features and working of the simulator. [French]

Tescola, G *Rail International* No. 12, Dec. 1977, pp 627-642, 11 Fig., 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

07 173574

**IF TUBE TRAINS AFFECT TREES, WHAT DO THEY DO TO US?**

Underground trains in San Francisco generate magnetic fields that are 1000 times stronger than the natural background. They are so strong that they set up measurable electric currents in trees. They must also generate electric fields in people, points out the Stanford University researchers who discovered them, and may well have long-term effects. He also wonders what their effect is on migrating birds, which may use magnetic fields to navigate.

*New Scientist* Vol. 75 No. 1064, Aug. 1977, pp 358-359

ACKNOWLEDGMENT: General Motors Research Laboratories

ORDER FROM: IPC Magazines Limited, 66-69 Great Queen Street, London WC2E 5DD, England

DOTL JC

07 173576

**INFLUENCE OF "BIORHYTHM" ON ACCIDENT OCCURRENCE AND PERFORMANCE**

Biorhythm is a term used in connection with a theory which proposes that 3 basic cyclical rhythms occur regularly in human beings starting at the moment of birth. The cycles are the 23 day physical cycle, the 28 day emotional cycle and the 33 day intellectual cycle. It has been proposed that biorhythms could be widely applied in industrial, medical, educational, athletic, military, governmental, and diplomatic fields. This paper investigates the relationship between "biorhythms" and events occurring in normal life. Data on single occurrence events such as accident data and unscreened deaths together with data on repetitive occurrence events related to performance at different sports were collected from various sources. A computer program was written to compute the state of each individual at the date of the event based on his birthdate and the biorhythmic cycle. Critical days of the cycles were also calculated. Results indicate that "biorhythm" had no significant influence on accident occurrence or

performance. No conclusive evidence in support of the current theory of biorhythm has been found in this study.

Khalil, TM (Miami University, Coral Gables); Kurucz, CN *Ergonomics* Vol. 20 No. 4, July 1977, pp 389-398, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 07 173579

##### INVERSION OF THE SLEEP WAKEFULNESS PATTERN: EFFECTS ON CIRCADIAN VARIATIONS IN PSYCHOPHYSIOLOGICAL ACTIVATION

Thirty-six habitually dayworking railway repairmen were exposed to a 3 week period of nightwork. The subjects were studied with respect to circadian rhythms in catecholamine excretion, body temperature, subjective alertness and mood. For half the group the measurements covered one 24 h period before nightwork, the first week of night work, the third week of night work and the first week after return to day work. For the other half measurements were made during the first and third day week after the night work. During day work weeks all variables exhibited pronounced circadian variation, peaking in the early afternoon, with the exception of body temperature which reached its maximum in the evening. During the first week of night work the day-oriented pattern of adrenaline excretion persisted but the mean 24 h level was increased and day sleep levels were very high. By the third week of night work the circadian pattern had flattened out at a very low mean level. For nonadrenaline excretion considerable adjustment (comparable to an inversion) to night work was seen with high night values. For body temperature, self-rated alertness and mood circadian functions flattened out during night work. It was concluded that all variables were strongly affected by the exposure to night work and that adrenaline excretion indicated a stress response of the organism.

Akerstedt, T (Karolinski Institut, Sweden) *Ergonomics* Vol. 20 No. 5, Sept. 1977, pp 459-474, 52 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

#### 07 174393

##### ON DESIGNING SIGNALS AND THEIR MEANINGS

The paper deals with types of human errors which are associated with the structural characteristics of signals and the meanings they convey. It begins with a theoretical analysis of signalling systems in general, resulting in the differentiation of various types of error and the formulation of some guidelines for reducing the sources of errors. The method of analysis is then applied primarily to a study of recall errors in railway signalling, including a comparison of two coding procedures and summaries of experimental findings.

Mashour, M (Stockholm University, Sweden) *Ergonomics* Vol. 20 No. 6, Nov. 1977, pp 659-664, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 07 175035

##### COMFORT CRITERIA FOR PASSENGERS OF RAPID TRANSIT SYSTEMS

[Beitrag zur

Festlegung von Komfortkriterien fuer Insassen von Schnellbahnsystemen]

The possibility of determining a common comfort limit for passengers traveling on rapid transit systems was investigated. The impairment of comfort by mechanical vibrations is discussed for low frequencies and the supine, sitting, and standing position. The effects of linear acceleration on comfort are reviewed. [German]

Vogt, L  
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-355-75-08, 1975, 43 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N78-13966/4ST

#### 07 175636

##### NIGHT VISION AND DARK ADAPTATION (A BIBLIOGRAPHY WITH ABSTRACTS)

Research reports are cited on the physiological aspects of night vision, as applied to human engineering for motor vehicle operators, pilots, military personnel, and other persons who must perform in low intensity illumination. (This updated bibliography contains 116 abstracts, 10 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0187, NTIS/PS-76/0133, and NTIS/PS-75/172.

Crockett, PW  
National Technical Information Service Bibliog. Mar. 1978, 121 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0206/9ST

#### 07 176709

##### ANTHROPOTECHNICAL STUDIES INTO THE LEGIBILITY OF WRITING IN PUBLIC PASSENGER TRANSPORT

[Anthropotechnische Untersuchungen zur Lesbarkeit von Schriftzeichen im oeffentlichen Personenverkehr]

Study into the legibility of the information supplied on the signs in DB stations. Particular attention is paid to the effect of passenger movement (person standing still, walking, running), the effect of the angle from which a sign is seen and the effect of contrast. [German]

Reinig, HJ *Eisenbahntechnische Rundschau* Vol. 26 No. 12, Dec. 1977, pp 843-847, 8 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

#### 07 177193

##### LAYOUT DESIGNER'S DATA PROJECTION RETICLE

Designers of visual displays and instrument panels often need to relate the known response capabilities of a large portion of the visual field to their particular design problem. The DPR may be used to derive the best location on a panel to position luminous warning indicators which must elicit rapid manual responses (e.g., fire warnings for engines). The reticle displaying anatomical features of the typical retina has been found useful in determining whether or not the rear-view mirror of an automobile is located so that its retinal image falls upon the blind spot of one eye--a situation which could be potentially serious for one-eyed drivers. Many other kinds of psychophysical vision data could also be incorporated into such a device.

Haines, RF (Ames Research Center) *Human Factors* Vol. 19 No. 6, Dec. 1977, pp 567-569, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 07 178137

##### TECHNIQUES AVAILABLE FOR THE ASSESSMENT OF PASSENGER COMFORT

Considers the many techniques which are available to the ergonomist for the assessment of passenger comfort.

Oborne, DJ *Applied Ergonomics* Vol. 9 No. 1, Mar. 1978, pp 45-49

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

#### 07 178139

##### PASSENGER EVALUATION OF UNDERGROUND IMPROVEMENTS

No Abstract.

Maw, J Bradley, J *Greater London Intelligence Journal* No. 37, June 1977, pp 28-31

ORDER FROM: Greater London Council, County Hall, London SE1 7PB, England

07 178437

**FUNCTIONS OF THE TRAINING PROCESS FOR THE DB'S FUTURE [Aufgaben des Bildungswesens fuer die Zukunft der DB]**

The DB's rationalisation measures have also affected the staff training programme (1975 budget: 761 million DM; 1976 budget: 635 million DM), hence the need to define new guidelines. Key areas on which future efforts will be concentrated are: in-service training, restructuring, among others. From the standpoint of quality, emphasis will be placed on staff motivation, greater involvement in productivity schemes, development of a corporate safety and customer-oriented attitude. [German]

Fruehwald, R *Deine Bahn (DB)* Vol. 6 No. 2, 1978, pp 65-66

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Eisenbahn-Fachverlag, Am Linsenberg 16, 6500 Mainz, West Germany

07 178493

**EFFECT OF ELECTRIC CURRENT ON PEOPLE [Ueber die Wirkungen des Elektrischen Stromes auf den Menschen]**

After a review of the historical development of the knowledge of electric current effects on man the paper outlines the state of the present research on the electric current effects on heart. New experiments have been performed regarding the resistance of living human body to currents of different intensities. Some considerations are explained concerning the practical impact of findings on the prevention of electric accidents. [German]

Biegelmeier, G *Elektrotechnik und Maschinenbau* Vol. 94 No. 3, Mar. 1977, pp 107-118, 36 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

07 178920

**PASSENGER VIBRATIONS AND TRACK ACCURACY**

The main purpose of this paper is to show how motions of human susceptibility to vibration can be related to track accuracy. It is hoped to give some impetus towards standard methods of specifying characteristics of track, vehicles and human response by quantitative studies. Present data is more extensive for vertical vibration than other modes. Vertical disturbances, therefore, are considered, but in the manner of indicating means, which, with further knowledge, might be applied to other modes of disturbance, and ultimately to varying postures of a passenger. One might start from either pole. That is by taking a given specification of track accuracy, or, alternatively, taking given criteria for passenger comfort. To commence from concepts of passenger susceptibility and derive appropriate track standards has seemed preferable. Rather more international unity is discernible in specifying human reaction than in defining a standard for track. It is also more logical to suppose that engineering standards might be improved by future techniques, whereas human beings remain unchanged.

Bramall, B *Prace a Studie Vysokej Skoly Dopravnej z Ziline* No. 3, 1978, pp 7-26

ACKNOWLEDGMENT: British Railways

ORDER FROM: Prace a Studie Vysokej Skoly Dopravnej z Ziline, Warsaw, Poland

08 172428

**SUMMARY OF RAILROAD-HIGHWAY GRADE CROSSING RESEARCH ACTIVITY**

This circular presents information on research underway, recently completed research and planned research. Reports on completed research projects are available from the National Technical Information Service (NTIS) and include among others, studies on the effectiveness of automatic protection at grade crossings, driver reaction to warning devices, state programs, in-vehicle warning systems, railroad-highway vehicular movement warning devices, enhancement of visual conspicuity of trains, stand-by power systems, etc. Research is currently underway in the areas of stop signs, active warning devices, grade crossing illumination, inventory/accident data analysis, institutional constraints, locomotive conspicuity, and the effectiveness of improvements. Research is planned on constant warning time devices, off-track train detection, and active advance warning signals.

*Transportation Research Circular* No. 190, Jan. 1978, 4 pp

ORDER FROM: TRB Publications Off

08 174377

**SUMMARY STATISTICS OF THE NATIONAL RAILROAD-HIGHWAY CROSSING INVENTORY FOR PUBLIC AT-GRADE CROSSINGS**

No Abstract.

Hitz, JS

Transportation Systems Center, Federal Railroad Administration Final Rpt. FRA-OPPD-77-8, June 1977, 160 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

08 175477

**POTENTIAL MEANS OF COST REDUCTION IN GRADE CROSSING MOTORIST-WARNING CONTROL EQUIPMENT. VOLUME I. OVERVIEW, TECHNOLOGY SURVEY AND RELAY ALTERNATIVES**

The results of a recent study of railroad-highway grade crossing warning system technology are presented. Emphasis in the investigation was placed on the determination of the potential for significant reduction in equipment, installation and maintenance costs through improvements sought within a framework of the basic (track circuit) system concepts now prevalent. This study comprises a comprehensive survey of current practices and hardware, an analysis of all major cost elements, and a consideration of potentially beneficial technical changes. The effort is concentrated on the equipment involved in train detection and the activation of warning devices. Special attention is given to European practices. The applicability of European signal relays and of mercury-wetted reed relays to the North American situation is analysed.

See also Volume 2, PB-277947, RRIS 08 175478, Bulletin 7802.

DuVivier, CL Rogers, LM Sheffield, W Foster, HJ  
Storch Engineers, Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-76-21-I, FRA/ORD-77/45-I, Dec. 1977, 178 pp

Contract DOT-TSC-870

ACKNOWLEDGMENT: NTIS

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PB-277946/OST

08 175478

**POTENTIAL MEANS OF COST REDUCTION IN GRADE CROSSING MOTORIST-WARNING CONTROL EQUIPMENT. VOLUME II. COMPARISON OF SOLID STATE AND RELAY DEVICES AND TECHNIQUES**

Consideration is given to the properties of solid-state circuits, miniature relays and large gravity-operated relays when applied to control systems for grade crossings equipped with train-activated motorist warnings. Factors discussed include original cost and service-life cost, vulnerability to environment, reliability and fail-safety, power requirements, maintainability, complexity of tasks to be performed and economic scale.

See also Volume 1, PB-277946, RRIS 08 175477, Bulletin 7802.

Holmstrom, FR

Lowell University, Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-76-21-II, FRA/ORD-77/

45.II, Dec. 1977, 50 pp

Contract DOT-TSC-589

ACKNOWLEDGMENT: NTIS

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PB-277947/8ST

08 176878

**FOOT-DRAGGING AT THE CROSSINGS?**

Despite the availability of federal-aid funds for grade crossing protection and surfacing, there have been institutional and legal constraints that have delayed the use of the funding. Federal Highway Administration cites slowness on the part of both the states and railroads. The experiences of five states, as collected in a report for FRA, are discussed. AAR is taking a growing role in promoting use of the federal money and railway suppliers have been conducting workshops.

Dick, MH *Railway Age* Vol. 179 No. 9, May 1978, pp 44-46, 3 Phot.

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08 177195

**CALCULATION OF HAZARD INDICES FOR HIGHWAY-RAILWAY CROSSINGS IN CANADA**

This paper presents a method for deriving the distribution of future accidents at a particular crossing based on several crossing characteristics. The accident history of a crossing is assumed to be a Poisson process, with its parameter a linear function of certain predictor variables. This parameter, the hazard index, is formed by solving maximum likelihood normal equations using an iterative process. Test procedures are given for the model using asymptotic results. Ramifications of these results, relative to the present government allocation methods for crossing upgrading are discussed.

Zalinger, DA Rogers, BA Johri, HP *Accident Analysis and Prevention* Vol. 9 No. 4, Dec. 1977, pp 257-273, 6 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

08 179112

**A STUDY OF STATE PROGRAMS FOR RAIL-HIGHWAY GRADE CROSSING IMPROVEMENTS**

In response to a DOT study of rail-highway grade crossing safety in the United States, the Congress passed the Highway Safety Act of 1973 which earmarked funds specifically for grade crossing improvements. Law requires the states to establish programs for identifying & implementing crossing improvement projects. This report examines the experiences of five states in establishing programs. The programs are discussed in terms of program initiation, project processing procedures, sources of funds, role of the regulatory agency, and maintenance of improved crossings. Descriptions of each state encompass grade crossing activity prior to 1973, the state's procedures, and types of improvements. The report also suggests some modifications to the current federal program which might enhance its effectiveness.

Prepared for the U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development.

Gertler, JB

Transportation Systems Center Final Rpt. DOT-TSC-FRA-78-3, FRA-OPPD-78-7, Feb. 1978, 174 pp, Tabs., 7 Ref., 6 App.

ACKNOWLEDGMENT: FRA

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DOTL RP

09 117479

**ACCEPTANCE SAMPLING OF STRUCTURAL PAINTS**

This report describes an investigation of acceptance sampling procedures for structural paints. The general paint manufacturing process is briefly described. Historical data on frequency of rejections under specifications formerly in force were analyzed, resulting in some changes in those for viscosity. New York State Materials Method 6 and Federal Test Method Standard 141a (Method 1021, which cover paint acceptance testing), are compared. Current sampling plans are discussed and analyzed and a suggested revision to the container sampling scheme is presented.

Report on Acceptance Sampling and Testing of Construction Materials; Interim Report No. 2.

Law, DA Anania, GL

New York State Department of Transportation, Federal Highway Administration, (NYSDOT-62-1) Intrm Rpt. NYSDOT-ERD-77-RR-53, May 1977, 26 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-275757/3ST

09 166562

**A CUMULATIVE DAMAGE THEORY OF FATIGUE FAILURE**

A rational phenomenological theory of fatigue lifetime prediction under arbitrary variation of cycle amplitude is presented. The theory is based on the concept of damage curve families and on an equivalent loading postulate which defines specimens that have suffered identical damage under different loading programs. Lifetime analysis has been performed for various cases of piecewise constant and continuous variation of cycle amplitude. For continuous variation, the method requires numerical integration of nonlinear first order differential equations which have been established in this work. (Author)

Hashin, Z Rotom, A

Tel-Aviv University, Israel, (9782) AFOSR-TR-77-0717, TAU-SOE-395-77, Feb. 1977, 37 pp

Grant AF-AFOSR-3014-76

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A041984/6ST

09 166620

**FATIGUE CRACK PROPAGATION IN HIGH STRENGTH LOW ALLOY STEEL PLATE, BAR AND FORGINGS**

This item presents fatigue crack propagation rate data in terms of linear elastic fracture mechanics. Data are presented on the rate of growth of fatigue cracks in high strength ( $(f \text{ sub } t) = \text{or } \equiv 850 \text{ MN/sq m})$  low alloy steel plate, bar and forgings. A low alloy steel is defined in the case as a steel where the percentage contribution of any particular alloying element is less than 5 per cent. The chemical composition and mechanical properties of the materials are given and are tabulated in order of increasing value of their 0.2 per cent proof stresses.

For information on availability of series, sub-series, and other individual data items, write NTIS, Attn: ESDU, Springfield, Va. 22161.

Engineering Sciences Data Unit ISBN-0-85679-180-6, Apr. 1977, 18 pp

ACKNOWLEDGMENT: NTIS

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ESDU-77005

09 169030

**EXPERIENCE WITH STEEL-FIBER-REINFORCED SHOTCRETE**

Steel-fiber-reinforced shotcrete is a composite material consisting of concrete and long steel fibers which are applied together in the gunning process. Due to the interaction of the slightly deformable compressed concrete and the highly deformable steel fibers, a material with entirely new properties is obtained. Previous experience indicates that steel fiber reinforcement does not produce a crucial modification of the concrete's cracking behavior, but rather an increase of the deformation capacity under tensile and compressive loading and, especially, a substantial increase of the time and load-bearing capacity between initial cracking and severance due to fracture of the steel fibers. Steel-fiber-reinforced concrete has properties completely different from those of steel-reinforced concrete. The difference is not gradual, but rather of a fundamental nature. (ERA citation 02:049237)

Translated from Tiefbau 16 pvp Dec 74. Microfiche copies only.

Ruffert, G

Battelle Memorial Institute/Pacific Northwest Labs Dec. 1974, 16 pp

Contract EY-7-C-06-1830

ACKNOWLEDGMENT: NTIS

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BNWL-tr-245

09 169198

**ELEVATED-TEMPERATURE MECHANICAL BEHAVIOR OF A CARBON-MANGANESE PRESSURE VESSEL STEEL**

The short-time effects of stress and temperature on the mechanical properties of a carbon-manganese pressure vessel steel were investigated using room-and elevated-temperature tensile tests and short-time creep-rupture tests. The tensile test results indicated that strain aging effects were not observed in the temperature range 1100 F to 1250 F. Analysis of the creep-rupture data, in the range 1150 F to 1250 F, by the Larson-Miller method using the procedures of Manson and Mendelson provided a value of 20.7 for the material constant, C. In the temperature and stress regime studied, a linear relationship was observed between  $\log(\text{stress})$  and  $\log(\text{-time-to-rupture})$ . Fractographic analyses revealed a common fracture mode in all specimens tested. The fracture mode is described as an intermediate type, containing features of both transgranular and intergranular fracture.

Sponsored in part by Federal Railroad Administration, Washington, D.C. Pub. in Jnl. Eng. Mater. Technol. 99, n4 p359-365 Oct 77.

Early, JG

National Bureau of Standards, Federal Railroad Administration Final Rpt. 1977, 7 pp

ACKNOWLEDGMENT: NTIS

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PB-274325/OST

09 169684

**MODIFICATION OF WOOD**

Contents: Theory of chemical plasticization; Properties of plasticized non-ground and ground wood; Technological problems of plasticized non-ground, laminated and ground wood; Some data on the process of pressing of wood-particle boards; Wood modification by radio-chemical method.

Trans. of mono. Modifikatsiya Drevesini, Riga, 1967. Sponsored in part by National Science Foundation, Washington, D.C. Special Foreign Currency Science Information Program.

Darzinsh, TA

Forest Service, National Science Foundation TT-72-51068, 1976, 401 pp

Contract NSF-C466

ACKNOWLEDGMENT: NTIS

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PB-273963-T/ST

09 172003

**RESISTANCE OF RAIL MATERIALS [Zaehigkeit von Schienenwerkstoffen]**

Description and results of tests on various aspects of the resistance of UIC-A, UIC-B and KVS 610 rails. Discussion of results and their practical implications in the choice of rail steels. [German]

Heyder, M Asbeck, HO *Eisenbahntechnische Rundschau* Vol. 26 No. 10, Oct. 1977, pp 684-690, 8 Fig., 3 Tab., 1 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

09 172007

**RAIL METALLURGY AND CAUSES OF DETERIORATION**

[Sinanyagok es ton kremeneteluk fobb okai]

During development of high-speed lines, Railways noticed that rail deterioration was increasing at a rapid rate. The authors give details of the manufacture of high-resistance steel rails. Test results show that non-alloyed carbon steel provides better resistance to wear and has higher fatigue threshold than alloyed steel. [Hungarian]

Summaries published in English, French, German and Russian.

Beres, L *Kozlekedestudományi Szemle* No. 5, May 1977, pp 220-225

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kozlekedestudományi Egyesület, Lapkiadó Vallalat, Lenin  
Korút 9-11, 1073 Budapest 7, Hungary

09 172015

**THE USE OF CELLULAR PLASTICS IN THE SWEDISH STATE  
RAILWAYS TO INSULATE AGAINST FROST** [Cellplast  
användning för isolering av ingenjörsgeologiska problem inom statens  
järnvägar]  
No Abstract. [Swedish]

Sandegren, E *Frost i Jord* 1977, pp 35-41, 8 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Royal Norwegian Council for Scientific & Indus Res,  
Gaustadalleen 25, Oslo 3, Norway

09 172586

**INFLUENCE OF CONTINUOUS CASTING OF RAIL STEEL ON  
THE PROPERTIES OF THE RAILS**

It has been found previously that an improvement in rail steel quality can be obtained by melting in basic oxygen furnaces and continuous casting, which reduces the structural and chemical heterogeneity occurring during solidification in conventional casting. A study was made of the macro- and microstructure in rails rolled from continuously cast 290 x 320-mm blooms and from mould-cast ingots. Photomicrographs taken after deep etching of specimens of Type R-50 and R-43 rails show centerline porosity in the former and no centerline porosity in the latter. The microstructure of the rails rolled from continuously cast blooms consisted of fine lamellar pearlite and tempered martensite; the microstructure of rails rolled from ingots was composed of coarse lamellar pearlite and tempered martensite. Numerical values indicating the fineness of the tempered martensite are presented.

Monich, OD Paisov, IV Polyakov, VV Nekhaev, VP Dolgunov, NV  
*Steel in the USSR* Vol. 4 No. 5, May 1974, pp 414-416, 4 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y  
5DB, England

09 172589

**THE EFFECT OF VACUUM DEGASSING ON THE QUALITY OF  
STEEL**

Conditions associated with the need for vacuum degassing of rail steel are investigated. High volume of carbon and manganese increases the occurrence of flaking and rail cracking is caused by the decrease in hydrogen solubility when the temperature is lowered. The latter condition is caused by a change in atomic state of hydrogen into a molecular state. An investigation is described in which steel was degassed using the D-H method, a search for a suitable deoxidation technology involving three series of melting was also undertaken. The chemical compositions of the metals were based on UIC-860 requirements. Data are plotted on curves showing the hydrogen content before and after degassing for metals involving different amounts of deoxidizers. During the period of degassing, 50 percent of the inherent oxygen was dissolved, which simultaneously eliminates most of the nonmetallic inclusions. Data are plotted which show differences in inclusion contents for nonkilled-and degassed-steels. [Polish]

Klisiewicz, Z Lipowczan, K (Instytut Metalurgii Żelaza-Gliwice, Poland)  
*Wiadomości Hutnicze* Vol. 29 No. 9, 1973, pp 296-299, 3 Fig., 4 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kubon & Sagner, 8 München 34, Schliessach 68, West  
Germany

09 172593

**BETTER ULTRASONIC RESOLUTION BY DATA UNFOLDING**

Conventional ultrasonics techniques for detecting defects at any great depths in thick steel give poor resolution because of beam spread. One partial answer to the problem is the use of ultrasonic holography techniques in which an image is formed of the defect; resolution is limited only by wavelength factors. However, the drawback to this technique is that it is not very satisfactory for real time since there is a waiting period between the examination and the visual presentation of data. Attempts to computerize the holographic process have not been very successful. As an alternative, in cases where a short timescale is essential, the authors propose a simple means of improving the resolution in ultrasonic data by means of unfolding

techniques. The results of the study were encouraging and indicate that, under some conditions, the techniques do improve resolution. More work is required to establish the approach with certainty and to investigate its limitations, especially with regard to defects having a more complex shape.

Silk, MG Lidington, BH *Non-Destructive Testing* Vol. 8 No. 2, Apr.  
1975, pp 84-99

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: IPC (America), Incorporated, 205 East 42nd Street, New  
York, New York, 10017

DOTL JC

09 172597

**UNCONVENTIONAL METHODS OF GENERATING, RECEIVING  
AND COUPLING OF ULTRASONIC WAVES FOR TESTING  
MATERIALS**

This paper reviews possible new methods of generating, receiving, and coupling ultrasonic waves in specimens, for ultrasonic testing. The possibilities of noncontact, nonliquid coupling with piezoelectric probes and other means are discussed. Among these are shock waves by electric sparks and lasers, holographic receiving methods by laser beams, eddy-sonic methods in nonmagnetic and magnetic materials, and others. A tabulation showing classification of the methods used for nondestructive testing according to levels of usage, applications, and restrictions is presented. Schematic illustrations show the principles of operation for each method.

Krautkramer, J (Wells and Krautkramer Limited, England) *British Journal  
of Non-Destructive Testing* Vol. 15 No. 3, May 1973, pp 76-82, 10 Fig., 19 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: IPC (America), Incorporated, 205 East 42nd Street, New  
York, New York, 10017

09 172598

**HARDENABILITY OF STEEL FOR HIGH-STRENGTH RAILS [O  
prokalivayemosti stali dlya vysokoprochnykh rel'sov]**

The important technical property of hardenability of rail steel is reviewed from the standpoint of increasing rail efficiency and its endurance. The efficiency of rails can be assured by increasing the contact fatigue strength of the steel by means of heat treatment. Thermal treatment results in a homogeneous structure of sorbite in the rail head at depths affected by contact stresses. Comparisons are made using data concerned with rail end hardenability according to GOST 5657-59, which involves quenching or tempering in oil of the rail heads to establish a standard. It is concluded that sufficient hardness of the rail can be obtained by complex alloying of the steel to a general content of about 3 percent. [Russian]

Safonova, KE *Trudy VNIITZ* Proceeding No. 509, 1974, pp 129-133, 1  
Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Mary-  
land, 20852

09 172600

**METALS. METHODS OF MECHANICAL AND  
TECHNOLOGICAL TESTING: GOST 12503-67. STEEL.  
ULTRASONIC TESTING METHODS. GENERAL STATUS**

The standard for ultrasonic testing methods for steel (GOST 12503-67, effective date: 1 April 1967), as developed by the All-Union Scientific-Research Institute of Ferrous Metallurgy imeni Bardin, U.S.S.R., is given. It establishes the methods of ultrasonic control for sheet and strip 8 mm, and greater, in thickness; forged and rolled billets and rolled stock with round and square cross section 80 mm, and greater, in diameter or on a side, made of carbon alloyed and high-alloyed steel and alloys.

All-Union Sci Res Inst of Ferrous Met imeni Bardin JPRS 59280, June  
1973, pp 300-304

ACKNOWLEDGMENT: Battelle Memorial Institute  
ORDER FROM: Joint Publications Research Service, Department of Com-  
merce, Washington, D.C.



09 172602

**EFFECT OF STRUCTURE PARAMETERS ON THE FATIGUE LIFE OF RAIL STEEL [Vliyaniye parametrov struktury na zhivuchest' rel'sovoy stali]**

An investigation to determine the effect of size of austenite grain and perlite dispersion (interlamellar distance) on the propagation of fatigue cracks and mechanical properties of rail steels is described. The chemical composition of the rail steels tested is given. Different dimensions of austenite grains were observed while changing the austenization temperature from 800 to 1250 degrees C. as well as dispersion of perlite as a function of cooling rates. The modes of heat treatment given to the various test specimens are described. The data obtained show the decisive effect of interphase-boundary density on rail-steel viability. The test equipment used for determining rail-steel viability, means for recording data, and the relation between perlite properties and the effect of interlamellar spacing are shown. [Russian]

Kiseleva, TN *Trudy VNIITZ* Proceeding No. 509, 1974, pp 125-129, 4 Fig., 2 Tab., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

DOTL JC

09 172607

**ACOUSTIC EMISSION TRANSDUCER CALIBRATOR**

A method for calibrating an acoustic-emission transducer is described. The acoustic emission transducer is calibrated by comparing its output signal with that of a primary standard transducer. A primary standard calibration equipment layout is shown with a photograph of the transducer. Facilities for the calibration of transducers are described showing the block and related test equipment. Some of the results from experiments are revealed in an acoustic emission transducer calibration curve.

Leschek, WC (Westinghouse Research Laboratories) *Materials Evaluation* Vol. 32 No. 2, Feb. 1975, pp 41-48, 9 Fig., 19 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: American Society for Nondestructive Testing, 914 Chicago Avenue, Evanston, Illinois, 60202

DOTL JC

09 172608

**APPLICATIONS OF FREQUENCY ANALYSIS IN ULTRASONIC TESTING**

Applications and theory associated with control of ultrasonic test variables, identifying and sizing flaws, and improving resolution both for thickness measurements and detection of near-surface flaws are presented. The advantages of spectral analysis techniques in reproducibility, precision, simplicity, and evaluation of importance of discontinuities in materials are discussed. Examples of discontinuity spectra for welds are shown in graphic form with the corresponding oscillographs.

Whaley, HL Cook, KV Laszlo, A McClung, RW (Oak Ridge National Laboratory) *Materials Evaluation* Vol. 33 No. 1, Jan. 1975, pp 19-24, 6 Fig., 1 Tab., 10 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: American Society for Nondestructive Testing, 914 Chicago Avenue, Evanston, Illinois, 60202

DOTL JC

09 172609

**ON-LINE AUTOMATIC ULTRASONIC INSPECTION**

In 1970, the Keihin Works of NKK, Kawasaki, Japan, installed an automatic ultrasonic testing system (based on the pulse reflection method with double crystal probes) on the finishing line of their 134 in. heavy plate mill. The system has a combination of four automatically controlled testers and is capable of testing a portion over a width of 2 in. on the periphery and over 25 percent at the center portion. Plates to be tested for interior defects were from 6 to a maximum of 19 mm thick, the range capable of being sheared on the line. Efforts were directed toward solving problems related to high-speed testing at elevated temperatures and flaw-distance dependence on testing sensitivity. The resulting system operates without precooling equipment with plate temperatures up to 200 C and at a speed of 40 m/min. Distance-amplitude correcting circuits in the receiving section permit proper evaluation of flaws, including surface flaws. Test information is fed back to the rolling and steelmaking operation by a computer, thus contributing to improved plate quality.

Matsumura, Y Katsuyuki, N (Keihin Works, Nippon Kokan KK, Japan) *Iron and Steel Engineer* Vol. 52 No. 4, Apr. 1975, pp 75-79, 11 Fig., 1 Tab., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Association of Iron and Steel Engineers, Empire Building, Pittsburgh, Pennsylvania, 15222

09 172610

**ULTRASONIC INTERNAL FLAW DETECTION SYSTEM FOR SLABS, BLOOMS, AND BILLETS**

Rolling mill nondestructive inspection needs are discussed with particular emphasis on the detection of piping. The use of automatic ultrasonic inspection is discussed to demonstrate inspection improvements in relation to on-line speed and good quality control. Descriptions and specifications for prototype ultrasonic testing machines for blooms, billets, and slabs are given. A sketch of the bloom testing machine is provided, and arrangement of the ultrasonic probes is shown. The machine incorporates a marking system that provides identification for three different types of defects.

Shaw, D (Davy Instruments, Limited, England) *Iron and Steel Engineer* Vol. 52 No. 7, July 1975, pp 38-41

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Association of Iron and Steel Engineers, Empire Building, Pittsburgh, Pennsylvania, 15222

09 172611

**SETTING OF SENSITIVITY OF ULTRASONIC EQUIPMENT FOR WELD INSPECTION**

The disadvantages of current methods of setting sensitivity of ultrasonic equipment for weld inspection and the work put forth by the author in connection with overcoming these disadvantages are discussed. The approach utilizes commonly used ultrasonic equipment and a variety of grease-coupled probes. The author's work leads to putting forward a general formula for sensitivity in terms of the amplitude from a reference hole on a 11W block and the attenuation. Working examples and practical advice to the operators is given. The application of Krautkramer Types USK5 and USM2 test equipment is described in this article.

Pinondel, MJ (Welding Institute, France) *Non-Destructive Testing* Vol. 6 No. 2, Apr. 1973, pp 86-91, 4 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: IPC (America), Incorporated, 205 East 42nd Street, New York, New York, 10017

DOTL JC

09 172612

**THE DISTRIBUTION OF STRESS NEAR THE TIP OF A RADIAL CRACK AT THE EDGE OF A CIRCULAR HOLE**

The problem of determining the distribution of stress near the tip of a crack which originates at the edge of a circular hole in an infinite elastic solid is examined. A Mellin transform technique is used to find an integral equation which is related to the stress intensity factor and the formation energy of a crack at the edge of the circular hole. The biaxial loading case is considered in detail and numerical results are given.

Tweed, J (Glasgow University, Scotland); Rooke, DP (Royal Aircraft Establishment) *International Journal of Engineering Science* Vol. 11 No. 11, Nov. 1973, p 1185, 2 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

DOTL JC

09 172613

**ELASTIC CIRCULAR INCLUSION IN AN INFINITE PLANE CONTAINING TWO CRACKS**

The elastic fields in an elastic circular inclusion and surrounding infinite matrix containing two cracks symmetrically simulated are determined when the matrix is subjected to loads at infinity. In this problem, the elastic properties of inclusion could differ from those of the matrix. The Muskhelishvili's technique is used. The solution depends upon two sets of suitable complex potentials for matrix and inclusion respectively, which solves the problem.

Bhargava, RD Bhargava, RR (Indian Institute of Technology) *International Journal of Engineering Science* Vol. 11 No. 4, 1973, pp 437-449, 5

Fig., 9 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

DOTL JC

#### 09 172615

##### CYCLE COUNTING FATIGUE DAMAGE

This paper describes a recently introduced counting method and presents comparisons between various fatigue-life predictions based on this and another common cycle-counting method. This new technique is known as the rainflow or Pagoda-Roof method. It is compared in this document with Range-Mean analysis which has been used extensively in recent years. An essential step in the prediction of the fatigue life of vehicles and structures is the reduction of a service strain or stress history to a series of cycles and half cycles (ranges). This process is known as cycle counting and can be the source of large but unnecessary errors in the subsequent life prediction.

Statistical Aspects of Fatigue Testing Symposium, Warwick University, February 12, 1975.

Watson, P (British Railways Research & Development Division)  
Society of Environmental Engineers 1975, 32 pp, 15 Fig., 12 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Society of Environmental Engineers, 68a Wigmore Street, London W1H 9DL, England

#### 09 172620

##### THE APPLICATION OF FRACTURE MECHANICS TO RAILWAY FAILURES

An attempt is made to demonstrate both the potential and current limitations of fracture mechanics in the context of railway engineering. The main limitations are the need for detailed service stress data and the establishment of appropriate stress-intensity factor calibrations. If tougher (K) materials are brought into service it will be necessary to characterize crack-tip conditions in the presence of extensive plasticity. The benefits of applying a fracture-mechanics approach to railway failures are outlined.

*Railway Engineer* Vol. 3 No. 4, July 1974, pp 6-17, 22 Fig., 1 Tab., 33 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

DOTL JC

#### 09 172621

##### DEVELOPING A METHOD OF THERMAL REINFORCEMENT OF HIGH STRENGTH RAILS

This paper reviews methods of thermal strengthening steel rails which permit selections of an optimum microstructure at a given level of hardness (BH 450-480). The methods discussed involve normal volume hardening with tempering, stepwise volume hardening with tempering, isothermic hardening with and without tempering, high-temperature thermomechanical treatment, and high-temperature thermomechanical treatment with bainite transformation with and without tempering. Tabulated information is presented on types of steels tested, their chemical compositions, and their mechanical properties when strengthened. Graphs which are presented showing effect of hardness on the contact strength; head, web, and base hardness; brittle-fracture values for three different steels; and the occurrence of failure during low-temperature impact tests. It was concluded that none of the methods of rail hardening provided high contact strength and necessary reliability needed. Additional tempering of the web and base increased rail viability.

Rauzin, YR Shur, YA Zonov, PN Velikanov, AV *Vestnik VNIITZ*  
No. 3, 1974, pp 45-50, 2 Fig., 4 Tab., 5 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

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#### 09 172623

##### REDUCTION AND ROLLING OF CONTINUOUSLY CAST METAL [Redutsirovaniye i prokatka metalla nepreryvnoy razlivki]

This book contains 17 chapters associated with the reduction and rolling of continuously cast metal into railroad rails and pipes. The early chapters deal with state of reduction as it applies to deformation stress, the end scab, power conditions, strip stability, and roller calibration. Subsequent chapters

deal with the requirements for obtaining high-quality rolled products, the influence of deformation on the properties of the metal, packing of the metal in the process of reduction, quality of the surface of the cast metal, the industrial practice of reducing and rolling of cast slabs, and the rolling of products. [Russian]

Chizhikov, M *Metallurgiya* 1974, 384 pp, 8 Fig., 16 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

#### 09 172650

##### ANAEROBIC ADHESIVES

After reviewing the characteristics of these adhesives, the authors describe their uses in engineering assembly.

Wainwright, P Bolt, R *Engineering Materials and Design* Vol. 21 No. 10, Oct. 1977, pp 32-35

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

#### 09 172925

##### EFFECT OF STRUCTURE OF RAIL STEEL ON ITS MAGNETIC PROPERTIES [O vliyani struktury rel'sovoy stali na eyo magnitnye svoystva]

Studies of the magnetic properties of rail steel of standard chemical composition and having a lamellar structure are described. Magnetic parameters such as coercive force and maximum, minimum, and initial magnetic permeability of the rail steel are shown in graphical illustrations. Correlations are made between the saturation and residual magnetism of the metal. The relations studied suggest that the coercive force and magnetic permeability are the most sensitive indications of metal structure. This is further shown by plotting the change in coercive force, magnetic permeability, and hardness in relation to tempering temperatures. Experimental studies were performed by using two batches of rails produced at the Kuznetsk Metallurgical Combine and the test results are briefly described. It was found that work-hardening of rail-head metal which occurs on exposure to operating loads causes changes in hardness and the magnetic characteristics, such as coercive force, increase while magnetic permeability decreases. [Russian]

Zarochentsev, GV Kozhevnikov, GI Yushkevich, IN *Trudy VNIITZ*  
No. 508, 1974, pp 43-48, 4 Fig., 3 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

#### 09 172927

##### THE EFFECT OF PERIODIC-RANDOM LOADING ON FATIGUE CRACK GROWTH

A theory of fatigue crack growth based on the concept of damage accumulation is presented which takes some account of the effect of periodic-random loading. The Dugdale model of plasticity is used to calculate the distribution of the energy dissipated during stress cycling in the plastic zones of a crack embedded in a material sample of infinite extent. The author shows how to calculate the damage accumulated by decomposing the random group of stress levels into significant complete stress cycles of various amplitudes. A simple short numerical algorithm is presented which performs this decomposition. A crack-growth law is derived having a very simple form which automatically incorporates the condition for catastrophic failure.

McCartney, LN

National Physical Laboratory, England Prepub Rpt N B-630, July 1975, 31 pp, 6 Fig., 9 Ref., 1 App.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: National Physical Laboratory, England, Queens Road, Teddington, Middlesex, England

#### 09 173046

##### METHOD OF EVALUATING THE CONTACT STRENGTH OF RAIL STEEL

A method using laboratory equipment for the simulation of the main types of contact damage experienced during rail usage is described. The author states that the use of the method provides data which show the actual

relation of contact damage in rails to the carbon content and surface hardness of the steel. The conditions that lead to contact or surface damage of rails are defined in terms of fatigue fracture, variable stresses, types of damage, and fractures caused by rolling and rocking. A description is given of the four-roller machine that is used for contact-fatigue testing and of the various changes that take place within the rail specimen as it is subjected to actions of each roller. Data are included for tests on R50 rails which show extent of rail damage as a function of carbon content of the steel.

Kislík, VA (Railroad Transportation Engrs Institute, USSR);

Karmazin, AI (Railroad Transportation Engrs Institute, USSR) *Zavodskaya Laboratoriya* Vol. 30 No. 12, Dec. 1974, 2 pp, 3 Fig., 1 Tab.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Consultants Bureau, Limited, 227 West 17th Street, New York, New York, 10011

09 173048

#### BUCKLING OF CONTINUOUSLY SUPPORTED BEAMS

The buckling of infinite beams continuously supported by a semi-infinite elastic continuum is investigated. The buckling loads were determined when the beam rests on a two-dimensional elastic continuum and also when the foundation extends beyond the width of the beam. The effect of the outside foundation is shown by comparing the obtained buckling loads. The author considered the use of the Winkler foundation, in his buckling analysis, but because of its periodicity, chose to use the Fourier series and transforms for the transverse direction. The effect of extending the elastic continuum beyond the width of the beam is shown by a graphical comparison.

Murthy, GKN (New York City Department of Health) *ASME Journal of Applied Mechanics* Vol. 50 No. 2, Series E, June 1973, pp 546-552, 2 Fig., 15 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: ASME

DOTL JC

09 173050

#### EFFECT OF THE PROCESS EQUIPMENT ON THE END DISTORTION OF RAILS

Process-stream measurements were made of the end cambers in a group of P-65 type rails in the planes of greatest and least rigidity at the main points of process treatment in the rail and beam shop at the Kuznets Iron and Steel combine. The greatest end distortions are produced in the rails during transfer from the hot saw and after the decelerated-cooling pits, the sign of the camber remaining almost constant at all treatment points. Opposite-sign camber can appear after the rails are straightened, but the back ends (in the direction of rolling and process flow) are not susceptible to straightening. Straightening on a stamping press may be responsible for the rails' opposite-sign camber, the amount of distortion depending to a large extent here on camber measurement accuracy as well as on the straightener's experience.

Pokatilov, YP Lysenko, IK (Siberian Metallurgical Institute, USSR) *Stal'* No. 11, 1973, 2 pp, 5 Fig., 2 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

09 173051

#### CONTROLLING THE DEPTH OF SURFACE HARDNESS IN RAILS

Ultrasonic control of hardening depth during the process of surface hardening of rails is discussed. The processes of ultrasonic energy reflection, scattering, and transformation of vibrations are reviewed. Illustrations showing the relation of size of energy losses of the ultrasonic vibrations in steel as a function of the ratio of wavelength to average grain size are presented. The process used for monitoring the depth of hardening is described. The device used for the monitoring is briefly discussed, as well as the methods used for arranging the emitters and receivers on a surface of the test specimen. It was concluded that at certain ratios between the wavelength and the average grain dimensions in the zones of hardening and of raw metal, it is possible to monitor the hardness depth of rails heat treated by high-frequency induction-current heating. [Russian]

Zarochentsev, GV Yushkevich, IN *Trudy VNIIT* No. 508, 1974, pp 36-43, 6 Fig., 8 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

09 173052

#### DEVELOPMENT OF A SCHEDULE FOR THE HEAT TREATMENT OF HIGH-STRENGTH RAILS

Results of laboratory trials to determine an optimum method for heat treatment of high-strength rails produced by the Nizhnii-Tagil' and Azovstal' works are reported. The mechanical properties of rail-steel between specimens and full-section rails were compared after normal treatment, isothermal quenching, a process described as HTMT and one described as HTMT followed by isothermal decomposition of the austenite. Difficulties in obtaining a combination of high contact fatigue strength and resistance to brittle fracture (impact strength and endurance under fatigue loading after initiation of a crack) through the use of conventional methods are discussed. A schedule incorporating differential tempering, which comes highly recommended for the purpose of compliance with current practices and available equipment, is described.

Rauzin, YR Shur, EA Zonov, PN Velikanov, AV *Stal in English* No. 12, Dec. 1974, 5 pp, 3 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Metals Society, 1 Carlton House Terrace, London SW1Y 5DB, England

09 173165

#### FATIGUE PROBLEMS IN LAND TRANSPORT

The paper concentrates on two examples drawn from railway engineering and examines the contribution which improved knowledge of crack propagation could make to design methods and to safety. In the first example the potential advantages of a crack-propagation model for fatigue of welds under variable-amplitude loading is discussed; in the second the importance of crack-propagation information to safety standards for axles is explained. Current inability to deal with small cracks is a major handicap.

Special Issue on Fatigue, Paper presented at Fatigue 1977 Conference Univ. of Cambridge, England, March 28-30, 1977.

McLester, R (British Railways Res & Dev Division) *Metal Science* Vol. 11 No. 8-9, Aug. 1977, pp 303-307, 20 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 173382

#### A REVOLUTION IN ALUMINIUM

The advantages of lightweight aluminum construction for rolling stock have traditionally been gained at the price of higher materials and manufacturing costs. Improvements in materials and fabrication techniques have been eroding this drawback. New, continuous welding of large extrusions promises to add power cost to aluminum's virtues.

*Modern Railways* Vol. 34 No. 351, Dec. 1977, pp 485-488, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

DOTL JC

09 173397

#### BSC CONTINUOUS CASTING ENHANCES RAIL QUALITIES

Workington Steel Works rolls a wide range of rails, most grades of which are from continuously cast blooms which offer the highest standard of mechanical and chemical qualities.

*Railway Engineer* Vol. 2 No. 6, Nov. 1977, 50 pp, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

09 173401

#### MFPG (MECHANICAL FAILURES PREVENTION GROUP)--DETECTION, DIAGNOSIS AND PROGNOSIS

These proceedings consist of a group of 24 submitted papers. The central theme of the proceedings is detection, diagnosis and prognosis as related to mechanical failure. The first session (6 papers) on oil analysis considers statistical analysis of wear-metal concentration, effective fluid analysis of

oil-wetted systems, and three papers on ferrographic analysis. Session II on mechanical signature analysis (6 papers) includes its use as a first step in quantifying the characteristics of operating machinery, the use of spectrum analysis, vibration signature analysis techniques, the role of signal processing, and diagnostic techniques for steam turbines and for induction motor rotors. Session III considers new detection, diagnosis and prognosis techniques and equipment (6 papers). Session IV has two papers on railroad system diagnosis (for train-accident reduction, and for railroad roller bearings). Session V (3 papers) discusses land-vehicle diagnostics, including diesel-engine diagnostics. A final paper describes remote diagnostic techniques used in Viking Lander operations.

Proc of the 26th Meet of the Mech Failures Prev Group, Chicago, Ill, May 17-19, 1977.

Shives, TR Willard, WA  
National Bureau of Standards Proceeding Spec Publ n 494, 1977, 296 pp

ACKNOWLEDGMENT: EI  
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09 173408

#### ESTIMATING FATIGUE CRACK INITIATION AND PROPAGATION LIVES IN NOTCHED PLATES UNDER VARIABLE LOADING HISTORIES

The most common failure mode of structures and components subjected to cyclic stresses/strains is fatigue. For analysis it is often convenient to separate the fatigue process into two parts: (1) a portion of life spent in crack initiation and (2) a portion spent in crack propagation. Typically, the ground vehicle industry has ignored the crack propagation portion of the total fatigue life and the aircraft industry has ignored crack initiation. Both initiation and propagation must be estimated in order to optimize the material and geometry for the application at hand. A method of estimating fatigue crack initiation lives for notched members subjected to irregular loading histories is described. It is based on a knowledge of the local stresses and strains at the notch root and material property data. Techniques for estimating crack propagation lives for notched members are also described. Crack propagation is calculated from constant amplitude materials data using an effective stress intensity concept. Finite element analysis is used to determine residual stresses and strains due to notch geometry. Analytical estimates are compared to experimental data from the SAE Cumulative Fatigue Damage test program. Procedures developed are intended to be applicable to structures and components fabricated from structural steels and aluminums subjected to pseudo-random or block load histories.

Socie, DF  
Illinois University, Urbana TAM Rpt n 417, June 1977, 85 pp, 31 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

09 173606

#### CONTROL OF WELDING STANDARDS: CONSTRUCTION OF LOCOMOTIVES AND ROLLING STOCK

Welding has become an extensively used method of construction of structures for locomotives, rolling stock, plant and equipment. This paper describes the methods and practices adopted to overcome the many problems associated with fabrication of welded structures. It is not the intention to discuss the causes of weld failures in specific cases nor the particular remedies adopted, but rather to describe the general approach in terms of training and education, in welding and technology, the adoption of detailed specifications and procedure controls used for the control of welding standards.

Hurst, JK *Institution of Mechanical Engineers Proceedings* Vol. 192 No. 2, 1978, pp 9-20

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

09 174416

#### FRACTURE BEHAVIOR OF A36 BRIDGE STEELS

The fracture toughness behavior of three heats of A36 steel was examined in terms of CVN response and K sub ic measurements at an intermediate rate of loading (i.e., one second rise time to failure). These results were contrasted with current AASHTO toughness requirements and heat or "H" testing frequency. It was concluded that "H" frequency testing could prove to be inadequate for fracture critical details. In such instances each piece of

steel should be tested for its CVN performance at the specification temperature. /Author/

Sponsored by DOT, Federal Highway Administration.

Roberts, R  
Lehigh University, Federal Highway Administration, (35F2-082) Final Rpt. FHWA-RD-77-156, Apr. 1977, 59 pp, 24 Fig., 7 Tab., 19 Ref.

Contract DOT-FH-11-8819

ORDER FROM: NTIS

PB-277908/OST, DOTL NTIS

09 174801

#### FINITE ELEMENT CAPABILITIES IN M. I. T. LINCOLN LABORATORY VERSION OF STRUDL

The well-known, general-purpose structural analysis program ICES-STRUDL has been used extensively at M. I. T. Lincoln Laboratory since its public release in 1967. Since that original release, several updates, issued by the original developers and the ICES Users Group, have produced changes in programs and documentation. Likewise, additional development and enhancement of ICES-STRUDL have occurred at M. I. T. Lincoln Laboratory on those areas (such as finite elements, dynamics, etc.) specifically of interest to the Laboratory. This report describes the finite element capabilities in the M. I. T. Lincoln Laboratory version of ICES STRUDL and can therefore serve as a user's manual. Sections are devoted to specification of finite element geometry, element properties, and element loading. Finite element modelling considerations are discussed and three examples are presented to illustrate capabilities often needed at the laboratory, but not described in other ICES-STRUDL documentation. (Author)

Britten, SS  
Lincoln Laboratory, (1227) TN-1977-17, ESD-TR-77-266, Sept. 1977, 81 pp

Contract F19628-76-C-0002

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A048605/OST

09 174905

#### PRODUCTION METHODS AND APPLICATIONS FOR CONCRETE POLYMER MATERIALS

Concrete polymer materials are being used world-wide in applications where high strength and durability are required. Methods for producing two materials, polymer impregnated concrete and polymer concrete, are discussed and their structural and durability properties summarized. Existing and potential applications for these materials such as for chemical storage tanks, pilings, pipe, curbstones, and bridge decks are reviewed. (ERA citation 03:007108)

20th annual AIChE meeting, New York, New York, USA, 13 Nov 1977.

Kukacka, LE  
Brookhaven National Laboratory, Energy Research and Development Administration CONF-771102-5, Mar. 1977, 12 pp

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

BNL-22640

09 175354

#### STRESS CRACK PHENOMENA. VOLUME 3. FEBRUARY, 1977-JANUARY, 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)

Stress analyses of various materials in which cracks are generated have been investigated in these reports. Stress corrosion, fracture mechanics, and crack propagation are also researched. Mathematical models and computer programs have been excluded from these reports. (This updated bibliography contains 167 abstracts, all of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0062. See also Volume 1, 1964-April, 1975, NTIS/PS-77/0061 and Volume 2, May, 1975-January, 1977, NTIS/PS-78/0148.

Habercom, GE, Jr  
National Technical Information Service Feb. 1978, 172 pp

ACKNOWLEDGMENT: NTIS

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NTIS/PS-78/0149/1ST

09 175355

**STRESS CRACK PHENOMENA. VOLUME 2. MAY, 1975-JANUARY, 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)**

Stress analyses of various materials in which cracks are generated have been investigated in this Government-sponsored research. Fracture mechanics and crack propagation are also investigated. Rock mechanics and rock fracture are excluded from the reports. (This updated bibliography contains 241 abstracts, none of which are new entries to the previous edition.)

See also Volume 1, 1964-April, 1975, NTIS/PS-77/0061.

Habercom, GE, Jr

National Technical Information Service Feb. 1978, 246 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0148/3ST

09 175358

**PRESTRESSED CONCRETE TECHNOLOGY (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)**

The physical and mechanical properties of prestressed and post tensioned concrete are investigated in these reports gathered in a worldwide literature survey. Highway bridges, highway surfaces, building members, reactor vessels, and miscellaneous concrete structures are reviewed. (This updated bibliography contains 256 abstracts, 52 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0097. See also NTIS/PS-78/0132.

Habercom, GE, Jr

National Technical Information Service Feb. 1978, 263 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0133/5ST

09 175359

**PRESTRESSED CONCRETE TECHNOLOGY (CITATIONS FROM THE NTIS DATA BASE)**

The physical and mechanical properties of prestressed concrete are investigated in these Government-sponsored research reports. Highway surfaces, highway bridges, and other concrete structures are reviewed. (This updated bibliography contains 237 abstracts, 21 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0096, NTIS/PS-76/0098, and NTIS/PS-75/211. See also NTIS/PS-78/0133.

Habercom, GE, Jr

National Technical Information Service Feb. 1978, 242 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0132/7ST

09 175419

**GENERAL DESCRIPTION OF THE FINITE-ELEMENT METHOD OF ANALYSIS IN ENGINEERING MECHANICS**

The finite-element method is a numerical technique of analysis in engineering mechanics, and has been developed simultaneously with the increasing use of high-speed electronic digital computers. For many engineering problems in real life, it is not possible to obtain an analytical solution. An analytical solution is a mathematical expression that gives the values of an unknown desired quantity at any location in a body in relation to the material behavior and prescribed boundary and/or initial conditions. In general, analytical solutions can only be obtained for simplified problems, notably of the linear class. When a problem involves temperature-and/or stress-dependent material properties, nonlinear deformations and complex boundary conditions, one is forced to make use of a computerized solution scheme in order to obtain the proper values of the unknowns at given discrete points in the continuum or body. The primary advantage of employing the finite-element method to determine the stress and strain distributions in a continuum is that the method can be systematically programmed to accommodate such difficulties as nonhomogeneous materials, nonlinear stress-strain behavior, time and thermal effects, and complex boundary conditions. (ERA citation 03:010755)

Hovland, H Russell, JE

Union Carbide Corporation, Energy Research and Development Administration Oct. 1977, 16 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

ORNL/SUB-3706/3

09 175923

**DEVELOPMENT OF ANALYTICAL AND EMPIRICAL SYSTEMS FOR PARAMETRIC STUDIES OF DESIGN AND FABRICATION OF WELDED STRUCTURES**

Part I of the report covers the development of a monograph entitled 'Analysis of Design and Fabrication of Welded Structures.' The monograph deals with the prediction of stresses, strains and other effects produced by welding. Part II covers the development of analytical means for predicting and controlling weld distortion in welded aluminum structures. Distortion in welded structures is caused by three fundamental dimensional changes, namely transverse shrinkage, longitudinal shrinkage and angular change. During the fabrication of actual structures, such as ships, airplanes and buildings which have various types of joints, these dimensional changes are combined. Therefore, shrinkage distortion that occurs in structures can be extremely complex. After a brief introduction, Section 2.2 discusses thermal stresses during welding, residual stresses and distortion in a general manner. The subsequent sections up to Section 2.6 discuss the analytical and experimental investigations carried out at M.I.T. on the prediction of various fundamental types of distortion. Finally, Section 2.7 deals with methods of distortion reduction, as they were tested by various investigators at M.I.T. (Author)

Papazoglou, VJ Masubuchi, K

Massachusetts Institute of Technology Final Rpt. Nov. 1977, 215 pp

Contract N00014-75-C-0469

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A050908/3ST

09 176697

**MATERIAL PERFORMANCE IN TRANSPORTATION VEHICLE INTERIORS**

The goal of this work is to study not only the performance of materials in standard tests but to study the performance of materials in real world environments and the relationship of criteria such as the above guidelines document to real improvements in those environments from a fire safety standpoint.

Nelson, GL (General Electric Company); O'Connell, WJ Williams, JB Bridgman, AL *Journal of Fire and Flammability* Vol. 8 No. 3, July 1977, pp 262-278, 15 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 177039

**STRUCTURE AND PROPERTIES OF ENGINEERING MATERIALS**

After decades in which metal alloys were the dominant materials used in engineering, recent developments have made other materials such as polymers and ceramics equal or superior in functionality or cost, for certain applications. Therefore, in revising their book, *Structure and Properties of Alloys*, the authors not only updated the text but broadened its scope by including new chapters on engineering polymers and on ceramics. The first six chapters present briefly the basic concepts of physical metallurgy. After considering the structure and properties of unalloyed metals, five chapters are devoted to the basic strengthening mechanisms of metals. The next 10 chapters cover the major nonferrous and ferrous alloys used industrially. Finally there are the two new chapters on nonmetallic materials. The book strives to cover the area between theoretical books and the practical handbooks so important to all engineers.

McGraw-Hill Series in Materials Science and Engineering.

Brick, RM

McGraw-Hill Book Company, Incorporated 4th Ed. 1977, 500 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering

ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

09 177163

**PREDICTION OF FATIGUE-CRACK GROWTH IN RAILROAD RAILS**

Methods for timely detection of fatigue cracks in rails in order to prevent failures are reviewed. Fatigue-crack-growth properties of rail steels were generated. Crack-growth experiments were performed using train-by-train service simulation stress histories based on measured load spectra. A rationale was developed to predict crack-growth in rails under service loading.

The 9th National SAMPE Techn Conf, Atlanta, Georgia, October 4-6, 1977.

Broek, D (Battelle Columbus Laboratories); Rice, RC  
Society for Advance of Material & Processing Engr NSTC V9, 1977, pp 392-408, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Society for Advance of Material & Processing Engr, Box 613, Azusa, California, 91702

09 178289

**HOW GOOD IS CREOSOTE? CONSIDERATIONS FROM THE MANUFACTURER'S STANDPOINT, ON A CONVENTIONAL WOOD-PROTECTION METHOD [Steinkohlenteeröl zeitge-maess? Betrachtungen ueber ein klassisches Holzschutzmittel aus der Sicht des Erzeugers]**

Comments on the advantages of creosote: protection of long duration against dry rot and insects, ease of application, ease of handling, good insulating qualities, economy. The drawbacks mentioned are seepage and inflammation. [German]

Bach, G *Die Holzschwelle* Vol. 72 No. 85, 1977, pp 37-57, 2 Tab., 7 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Studiengesellschaft fuer Holzschwellenoberbau EV, Wald-strasse 11, 5300 Bonn-Ippendorf, West Germany

09 178481

**NEW FURNACE FOR HEAT-TREATMENT OF WHEELS**

Recent use of trains with faster speed and heavier load has created the need for improved heat treatment of wheels. This article describes how Japan's Sumitomo Metal Industries Ltd. replaced its obsolete and problem-ridden heat treating furnaces with bogie devices by new furnaces using the rapid gas heating method. As a result, it now takes only one hour to heat-treat the wheels in a trouble-free operation. [Japanese]

Yamato, H Noda, T Tsumura, K Toya, Y *Sumitomo Metals* Vol. 30 No. 1, Jan. 1978, pp 124-135

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 178483

**INFLUENCE OF PRODUCTION PRACTICE ON FRACTURE TOUGHNESS OF RAILS**

Linear fracture mechanics were used to investigate fracture toughness anisotropy in R-65 type railway rails after rolling in a conventional two-roll finishing stand and a universal four-roll stand. The investigation showed the advantages of slow enclosed cooling in improving the cracking resistance of rail steel. Data were obtained on the change in crack-propagation resistance during service.

Chelyshev, NA (Siberian Metallurgical Institute, USSR); Tsvigun, VN  
*Steel in the USSR* Vol. 7 No. 4, Apr. 1977, pp 226-228, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 178489

**DETERMINING THE LIMITS OF REGULATING THE CARBON POTENTIAL DURING CARBURIZING**

It is expedient to solve this problem by means of calculations corrected by the results of experimental studies of separate carburizing conditions.

Gliner, RE *Metal Science and Heat Treatment* Vol. 19 No. 7-8, July 1977, pp 722-724, 1 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 178490

**DUCTILE AND BRITTLE FRACTURE OF STEEL**

Ductile and brittle fracture are distinguished by the condition of the fracture surface. A typical example of brittle fracture is the absence of traces of plastic deformation on the fracture surface. For all metals, especially bcc and hcp and even fcc metals (with the exception of copper and nickel), a change in the fracture mechanisms is observed (the threshold of cold brittleness) which is a characteristic sensitive to structure and composition. The transition to the brittle condition is an attribute of the crystal lattice and is probably due to an increase in the percentage of covalent bonds with decreasing temperatures.

Gulyaev, AP *Metal Science and Heat Treatment* Vol. 19 No. 7-8, July 1977, pp 618-619, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 178492

**STUDIES OF THE IMPROVEMENT OF THE DEGREE OF PURITY OF STEEL FOR RAILWAY TIRES [Badania nad poprawa stopnia czystosci stali na obrecze]**

The results of investigations aimed at implementing a new technological process of making St70P steel for the manufacture of railway tires are discussed. In particular, it is noted that deoxidation of steel with aluminum and subsequently with manganese and silicon with simultaneous scavenging with argon has yielded a steel of higher purity and a reduction of railway tire rejects of about 2%. [Polish]

Gudra, P (Huta Kosciuszko, Poland); Klisiewicz, Z *Hutnik* Vol. 44 No. 12, Dec. 1977, pp 548-556, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 178535

**FUNDAMENTAL AND PRACTICAL ASPECTS OF CRACK GROWTH UNDER CORROSION FATIGUE CONDITIONS**

The crack growth mechanism is dependent on environment, frequency and temperature as shown by some examples. Two cracking modes are observed in aluminum alloys: the tensile mode and the shear mode. Examples show that inert environments promote the shear mode whereas aggressive environments promote the tensile mode. Information from constant-amplitude tests need not be applicable to service loading conditions as illustrated by an example. Significant environmental effects on crack growths are observed in aircraft flight-simulating tests. Growth delays induced by severe flights occur in all environments. As a consequence the truncation of the load spectrum at the high level end is a difficult question. The problem of producing relevant information in the laboratory is discussed.

Schijve, J *Institution of Mechanical Engineers Proceedings* Vol. 191 No. 14/77, 1977, pp 107-114

ACKNOWLEDGMENT: British Railways

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DOTL JC

09 178538

**FINITE-ELEMENT UPDATE**

Finite-element stress analysis was originally a tedious, costly, and time-consuming process applied primarily to exotic aerospace hardware, but recent advances allow simpler, more exact solutions--at low cost. Today, the method is being applied to all manner of products ranging from bulldozers to home appliances.

Krouse, JK *Machine Design* Vol. 50 No. 1, Jan. 1978, pp 98-103

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

09 178922

**ENVIRONMENTAL CONTROL FOR A RAPID TRANSIT SYSTEM IN A TROPICAL CLIMATE**

The need for rapid transit systems in tropical cities has brought into focus the problem of giving acceptable conditions underground when the ambient temperature is elevated and coupled with high levels of humidity. It is an economic problem to set reasonable comfort levels. The amount of power liberated within a tropical underground system is discussed and the size of

air conditioning plant required for trains if these are used. Three general systems of dealing with the overall problems are discussed, together with the effect on the systems arising from the speed of the trains and the special problems created when stationary within the tunnels. The conclusions indicate that for tropical conditions a closed system underground is to be preferred without air conditioning on the trains. The use of power to achieve acceptable conditions is one of economics rather than a technical question, but cooling is expensive in energy for any underground system in the tropics.

Kibblewhite, GG *Institution of Mechanical Engineers Proceedings* Proceeding Vol. 192 No. 10, 1978, pp 171-178

ACKNOWLEDGMENT: British Railways  
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DOTL JC

09 179066

**EFFECT OF THERMOMECHANICAL TREATMENT ON THE PROPERTIES OF R-65 RAILS MADE OF LOW-ALLOY RAIL STEEL [Vliyaniye termomekhanicheskoi obrabotki na svoistva rel'sov P-65 iz nizkolegirovannoi rel'sovoi stali]**

A study was made of the possibility and effectiveness of high-temperature thermomechanical treatment of full-profile R-65 rails made of 65KhSGF experimental rail steel. Rolling of off-gage products from temperatures of 800 and 850 degrees with a 20% deformation was carried out in a four-roll universal pass of a 360 mill with subsequent quenching in oil to form martensite (tempering at 450 degrees C) and in a water-air mixture to form troostosorbite (self-tempering at 470-520 degrees C). An improvement in the mechanical properties by 20 to 30 kgf/sq mm in comparison with ordinary heat treatment was established. [Russian]

Gossman, AA Chelyshev, NA Kotov, AV *Izvestiia VUZ Chernaya Metallurgiya* No. 12, 1977, pp 111-113, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

09 179125

**FAST BALLAST AND SUBGRADE MATERIALS EVALUATION-BALLAST AND FOUNDATION MATERIALS RESEARCH PROGRAM**

The ballast, subballast, and subgrade materials from the FAST Project at Pueblo, Colorado were evaluated. Conventional characterization testing and repeated load triaxial testing were conducted with the various materials. The data included in this report were developed for bulk material samples forwarded to the University of Illinois. The test results do not reflect any "material variability" which would be encountered in the completed FAST Project.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Thompson, MR

Illinois University, Urbana Test Rpt. FRA-ORD-77/32, Dec. 1977, 31 pp, 17 Fig., 7 Tab., 2 Ref.

Contract DOT-FR-30038

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-281167/AS, DOTL NTIS, DOTL RP

09 180025

**TECHNOLOGY FORECAST '78**

The article deals with technological forecasts in the field of ferrous and nonferrous metallurgy and marginal areas. Covered are trends in the technology of steel; nonferrous metals; superalloys; special-duty materials; heat processing; casting; cleaning, finishing, and coating; forming; welding and joining; testing and inspection; powder metallurgy; plastics, ceramics, and composites; and basic production.

Chandler, HE Baxter, DF, Jr *Metal Progress* Vol. 113 No. 1, Jan. 1978, p 28

ACKNOWLEDGMENT: EI  
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10 053260

**RAILWAY NOISE. A THEORETICAL MODEL FOR THE PROPAGATION OF RAILWAY NOISE**

The report describes the basic principles, working and application of a computer program prepared for the specific interests of the railway. The procedure is suitable for planning new lines and checking noise protection measures introduced for existing installations. Output criteria are data for the planner or statistical sound levels used as limiting values and the equivalent continuous sound level.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways C137/RP 6, Apr. 1977, 30 pp, 3 Tab., 18 Phot.

ACKNOWLEDGMENT: UIC  
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DOTL RP

10 053280

**RAILWAY NOISE. GENERATION AND PROPAGATION OF RAILWAY NOISE: IN OPEN, FLAT COUNTRY (FREE-FIELD), IN CUTTING, ON EMBANKMENTS**

This report contains a survey of the information concerning the generation and propagation of railway noise in the vicinity of tracks and for various sites (free-field; cutting; embankment) taking into account the different types of train traffic and track equipment and in taking as reference basis the noise level measured close to an axle under a moving vehicle or in the vicinity of the track during the passage of the vehicle.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways C 137/RP 5, Oct. 1977, 43 pp, 25 Fig., 4 Tab., 2 App.

ACKNOWLEDGMENT: UIC  
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DOTL RP

10 117490

**REVIEW OF DIESEL COMBUSTION MODELS FOR NOX AND SMOKE EMISSIONS**

A comprehensive review of diesel emissions models is presented together with assessments of the pertinent fundamental NOx and soot kinetics. The results of diesel emissions experiments carried out at Southampton are also presented and correlations are suggested. The review suggests that available emissions models do not incorporate a sufficiently detailed description of the fundamental mixing and chemical kinetic processes occurring in the diesel. They cannot therefore be used predictively. Suggestions are made for model development, fundamental data acquisition and the use of incylinder experimental techniques. The latter are required to obtain data on the flowfield and mixing processes occurring in the diesel combustion chamber.

Anderton, D  
Southampton University, England, Transportation Systems Center Final Rpt. DOT-TSC-OST-76-57, Oct. 1977, 166 pp

Contract DOT-TSC-1101

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-276350/6ST, DOTL NTIS

10 169595

**ON THE PREDICTION OF WAYSIDE NOISE LEVELS FOR HIGH-SPEED RAILWAY VEHICLES**

The relative contributions of aerodynamic and wheel/rail noise to railway wayside noise levels are not well understood. Methods for predicting these contributions discussed in this paper include an equation for turbulent boundary layer noise (the minimum wayside noise), an empirical formula for total aerodynamic noise based on airframe noise studies, and the Peters equation for wheel/rail interaction noise. Comparisons are made between predicted and measured noise levels for a buoyant vehicle, the Linear Induction Motor Research Vehicle (LIMRV), and a magnetically levitated vehicle. Analysis of these results indicates that aerodynamic fluctuations could become the dominant source of wayside noise at train speeds of 240-280 km/h. This prognosis is for new high-speed railway vehicles equipped with disk brakes and other innovations that reduce the wheel/rail noise contribution.

King, WF, III

Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-257-77/6, 1976, 45 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N77-32846/6ST

10 169753

**CALINE 2-AN IMPROVED MICROSCALE MODEL FOR THE DISPERSION OF AIR POLLUTANTS FROM A LINE SOURCE**

In order for transportation planners and engineers to evaluate the air quality impact of a proposed project, mathematical means are required to describe the dispersion of air pollutants from a line source. CALINE2, the California Line Source Dispersion Model, is presented and discussed as one such mathematical approach. CALINE2 is based on the generalized Gaussian dispersion theory, and simulates the dispersion of carbon monoxide from a uniform line source. A sensitivity analysis of the model relates the behavior of its predictions as a function of the input parameters. A preliminary verification study using carbon monoxide data from the Los Angeles region gives the user an estimate of CALINE2's predictive capabilities. An earlier version of the model, which was distributed nationwide in 1972, is compared with the present version.

See also mag tape, PB-271 105 and User's Manual, PB-271 106.

Ward, CE Ranzieri, AJ Shirley, EC

California Department of Transportation, Federal Highway Administration Intrm Rpt. FHWA-RD-77- 74, CA-DOTTL-7218-1-7623, June 1977, 111 pp

RESPONSIBLE INDIVIDUAL: Jones, KE (HRS-42)

Contract OT-FH-11-7730

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275683/1ST, DOTL NTIS

10 170935

**ON THE ROLE OF AERODYNAMICALLY GENERATED SOUND IN DETERMINING WAYSIDE NOISE LEVELS FROM HIGH SPEED TRAINS**

The relative contributions of aerodynamic and wheel/rail noise to railway wayside noise levels are not well understood. Various methods for predicting these contributions are discussed in this paper and comparisons made for LIMRV and Maglev vehicles.

King, WF *Journal of Sound and Vibration* Vol. 54 No. 3, Oct. 1977, pp 361-378, 7 Phot., 51 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

10 170939

**RESEARCH INTO THE REDUCTION OF NOISE AND VIBRATION IN THE MOSCOW METRO [Opyt raboty po snizeniju urovnja suma i vibracii na Moskovskom metropolitene]**  
No Abstract. [Russian]

Bakulin, AS *Metropoliteny-Ekspluatacija i Tehniceskie Sredstva* Vol. 2 No. 6, 1977, 19 pp, 9 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Metropoliteny-Ekspluatacija i Tehniceskie Sredstva, Moscow, USSR

10 172012

**PRESSURE MEASUREMENTS ON AN ANTI-NOISE SCREEN WHILE DB HIGH-SPEED TRAINS ARE PASSING [Druckmessungen an einer Schallschutzwand bei Schnelfahrten der Deutschen Bundesbahn]**

These pressures were measured on two different types of anti-noise screen, for train speeds from 120 km/h to 250 km/h. The article describes the measuring procedure and gives results in diagrams, and goes on to explain a mathematical method for calculating aerodynamic pressures devised by Fukuchi and resulting from the analogy of form between equations for fluid movements and those for the theory of electrical potentials. [German]

Erler, HJ *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 750-754, 5 Fig., 7 Phot., 2 Ref.



ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

10 172629

## MONETIZATION OF INTANGIBLES: THE CASE OF POLLUTION

Quantification of the effects of air and noise pollution has no single best solution. Minimum total pollution cost is a combination of damage and control costs. It is suggested that pollution changes be calculated in measurable physical units which should then be complemented by cost estimates using avoidance costs, property value and damage cost. It is expected that all these techniques will be refined as pollution control is expanded.

Rock, SM (Illinois University, Chicago) *Transportation Journal* Vol. 17 No. 2, Dec. 1977, pp 32-39, 1 Fig., 28 Ref.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

10 173154

## PAINTING AND THE LAW

Materials, equipment, and procedures for architectural and maintenance painting in industrial plants are regulated by local, state, and Federal statutes, and plant personnel are faced with the almost impossible task of keeping up to date on all of them. Even when painting operations are being handled by an outside painting contractor, the plant engineer's company may still be held responsible for the contractor's work practices. Control over plant maintenance painting operations comes from three directions: industrial safety and health, general air pollution control, and consumer-oriented legislation. There are a number of established safety regulations for maintenance painting-- primarily those of the Occupational Safety and Health Act (OSHA)--covering activities common to many industrial operations. For example, regulations control construction and use of ladders and scaffolding use of abrasive-blasting equipment, and use and storage of flammable materials.

Baldwin, B *Plant Engineering* Vol. 31 No. 19, Sept. 1977, pp 148-154

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

10 173162

## STRUCTURAL IMPLICATIONS OF GOOD SOUND INSULATION

The examples shown in the paper illustrate the way in which structural transmission limits the attainable insulation. The use of vibration isolation can reduce the effect of such paths and sound insulation values in excess of 96dB average sound level difference have been measured in special cases.

Burd, A (Brown (Sandy) and Associates) *Society of Environmental Engineers, Journal* Vol. 16 No. 3, Sept. 1977, pp 27-30, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 173592

## EMBANKMENT VIBRATION CAUSED BY RUNNING TRAINS ON SHINKANSEN

The vibration of embankments caused by passage of the high-speed Shinkansen trains has been measured. The amplitude and frequency of earth pressure at each point were determined. The amplitude of the vertical vibration is predominant; the frequency of the horizontal vibration is the major element. The propagation of these vibrations is described.

Nasu, M Komine, T Yasuda, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Rpt No. 1029-77, Dec. 1977, pp 154-159, 13 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

10 173598

## STUDY ON HIGH-FREQUENCY VIBRATIONS IN TRACK OPERATED WITH HIGH-SPEED TRAINS

In analyzing the noise of high-speed trains, the sources and characteristics of high-frequency vibrations in the track were studied. Theoretical calculations of forced vibration due to the roughness of wheels and rails were correlated with actual measurements. Further study of the phenomenon is needed.

Sato, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Rpt No. 1013-76, Sept. 1977, pp 109-114, 6 Fig., 1 Tab., 2 Ref.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

10 173800

## MEASURING FOR ENVIRONMENTAL PROTECTION: INSTRUMENTS AND REQUIREMENTS FOR ASSESSING HARMFUL MATTER IN THE AIR

As an independently-acting body within the meaning of Art. 52 of the Federal Anti-Emission Act, the German Federal Railway must monitor its own compliance with the provisions of the Act. The Research and Test Establishment in Minden performs the measurements, which in private industry generally are the responsibility of the Technical Inspection Associations and equivalent bodies, and provides the measuring equipment necessary. The measuring circuits have to satisfy special requirements, and regular calibration of the equipment by means of built-in emission recorders is also provided for in the regulations. [German]

Ortmann, W Witulski, S *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 741-747

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

10 174034

## CETANE RATING AND LOAD EFFECTS ON COMBUSTION NOISE IN DIESEL ENGINES

Experiments were performed on a single cylinder air-cooled direct injection four stroke Diesel engine to determine the connection between combustion randomness and radiated noise. The tests reported carried the engine to its maximum fuel flow condition and investigated the effects of Cetane rating. The tests conclusively demonstrated that a substantial amount of the radiated noise is causally related to the randomness (turbulence) of the combustion process and not the mean pressure-time history. However, the higher the load, the less the effect of the randomness on total noise output.

Strahle, WC (Georgia Institute of Technology); Handley, JC Varma, MS *Combustion Science and Technology* Vol. 17 No. 1-2, 1977, pp 51-61, 6 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 174375

## FINANCE DOCKET NO. 28324: THE SOUTHERN MISSISSIPPI TRANSPORTATION COMPANY CONSTRUCT AND OPERATE A LINE OF RAILROAD LOCATED IN HARRISON COUNTY, MISSISSIPPI

No Abstract.

Interstate Commerce Commission 1977, 185 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, Washington, D.C., 20423

10 174376

## DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: NORTHEAST CORRIDOR IMPROVEMENT PROGRAM

No Abstract.

Submitted pursuant to 42 U.S.C. 4332(2) (c), 23 U.S.C. 128(a) and 49 U.S.C. 1653(f).

Federal Railroad Administration Aug. 1977, 624 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO  
ORDER FROM: FRA

10 174379

**DRAFT ENVIRONMENTAL IMPACT STATEMENT. FINANCE DOCKET NO. 27972...FINANCE DOCKET NO. 28464**

Finance docket no. 27972. Louisville and Nashville Railroad Company trackage rights over Grand Trunk Western Railroad Company South Bend Subdivision between Munster, Lake County, Indiana and Thornton Junction, Cook County, Illinois.--Finance docket no. 28464. Louisville and Nashville Railroad Company construction of connecting track over Grand Trunk Western Railroad Company at Munster, Lake County, Indiana.

Interstate Commerce Commission Aug. 1977, 157 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: Interstate Commerce Commission, Office of Proceedings, Section of Energy and Environment, Washington, D.C., 20402

10 174385

**CONTROLLING ENVIRONMENT IN HONG KONG'S SUBWAY SYSTEM**

The transit system proposed for Hong Kong presents factors that make proper engineering of the environmental control system (ECS) critical. Hong Kong experiences severe temperature and humidity conditions many months of the year, and the urban railway is designed to carry almost twice the maximum passenger loading of other comparable systems. The objective of the environmental control system is to provide for the comfort and safety of people and protection of equipment. Generally stated, the ECS should maintain temperature and humidity within prescribed tolerances; achieve effective control of airflow (both velocity and direction), air-quality and air-pressure transients; protect against condensation; and operate acceptable noise levels in stations, tunnels and to the external environment. The several concepts investigated by the design team are described and evaluated.

Hitchcock, WW (Parsons, Brinckerhoff, Quade and Douglas, Inc);

Driver, DE *Specifying Engineer* Vol. 38 No. 3, Sept. 1977, pp 78-83, 3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

10 175257

**WORKSHOP ON HEALTH EFFECTS OF TRANSPORTATION-RELATED POLLUTANTS, HELD AT RALEIGH, NORTH CAROLINA, ON JUNE 15-16, 1977**

The Department of Transportation, recognizing the need for further health effects research data in assessing the environmental implication of its policies over the next several years, called upon the Environmental Protection Agency's health effects group to bring together key experts in the field to address both DOT's and EPA's research needs and to evaluate resources available. This report is a brief summary of the presentations and conclusions of the DOT-EPA sponsored Workshop on Health Effects of Transportation-Related Pollutants held at the Sheraton-Crabtree Motor Inn, Raleigh, North Carolina, on June 15-16, 1977. This report is, in part, interpretive and intended to supply a synopsis and not a verbatim transcript of the proceedings.

Sponsored in part by Department of Transportation, Washington, D.C.

Duffield, FP Lee, RE

Environmental Protection Agency, Department of Transportation  
EPA/600/1-78/011, Jan. 1978, 38 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276977/6ST

10 175295

**PERFORMANCE AND EMISSIONS OF A CATALYTIC REACTOR WITH PROPANE, DIESEL, AND JET A FUELS**

Tests were made to determine the performance and emissions of a catalytic reactor operated with propane, No. 2 diesel, and Jet A fuels. A 12-cm diameter and 16-cm long catalytic reactor using a proprietary noble metal catalyst was operated at an inlet temperature of 800 K, a pressure of 300,000 Pa and reference velocities of 10 to 15 m/s. No significant differences between the performance of the three fuels were observed when 98.5 percent

purity propane was used. The combustion efficiency for 99.8-percent purity propane tested later was significantly lower, however. The diesel fuel contained 135 ppm of bound nitrogen and consequently produced the highest NOx emissions of the three fuels. As much as 85 percent of the bound nitrogen was converted to NOx. Steady-state emissions goals based on half the most stringent proposed automotive standards were met when the reactor was operated at an adiabatic combustion temperature higher than 1350 K with all fuels except the 99.8-percent purity propane. With that fuel, a minimum temperature of 1480 K was required.

Conf-Presented at the Fall Meeting, Western States Section of the Combust. Inst., Stanford, Calif., 17-18 Oct. 1977.

Anderson, DN

National Aeronautics and Space Administration NASA-TM-73786, Sept. 1977, 26 pp

Contract EC-77-A-31-1011

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

N78-14177/7ST

10 175308

**CONTROLLING POLLUTION THROUGH COMBUSTION RESEARCH**

The document provides background information about the Combustion Research Branch (CRB) of EPA's Industrial Environmental Research Laboratory, Research Triangle Park, North Carolina. The focus of CRB's programs is on reducing emissions of oxides of nitrogen, and simultaneously determining the effect on other emissions and on equipment performance. A program overview is provided with a brief description of each major program area. A description of technology transfer methods is given and future goals are discussed.

Acurex Corporation, Environmental Protection Agency Final Rpt.  
EPA/600/8-77/019, Dec. 1977, 15 pp

Contract EPA-68-02-2611

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276975/0ST

10 175802

**A LABORATORY COMPARISON OF IN-LINE AND END-OF-LINE FULL-FLOW, DIESEL SMOKE OPACITY METERS**

This report describes a cooperative round robin type program to compare the response characteristics of in-line (INL) and EPA end-of-line (EOL) diesel smoke opacity meters. Test results indicated the INL and EOL meters correlated well, agreeing approximately 75% of the time. Best correlation was obtained by using a modified Beer-Lambert expression, i.e., correcting the absorption coefficient for meter emitted light wavelength. The study recommends that future tests consider including detailed optical response characteristics. Further investigation into the use of neutral density filters as calibration standards as well as research to ascertain whether or not the exhaust gas temperature has any effect on smoke correlation are also recommended. (Portions of this document are not fully legible)

Coordinating Research Council, Incorporated, (APRAC-CAPI-1-64)  
CRC-495, Aug. 1977, 66 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-278076/5ST

10 176696

**THE NOISE FROM THE TRANSPORT MODES EXPRESSED AS AN EQUIVALENT ACOUSTIC LEVEL [Bruit des moyens de transport. Expression en niveau acoustique equivalent]**

Calculation of the acoustic level of the noise of road vehicles, trains and planes with brief explanations of the physical phenomena of noise propagation and means to establish the acoustic level in front of a building. [French]

Gilbert, P *Centre Scientifique et Tech du Batiment. Cahiers* No. 185, Cahier 1482, Dec. 1977, pp 1-25, Tabs., 55 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Centre Scientifique et Technique du Batiment, 4 Avenue du Recteur Poincare, Paris 16e, France

10 176700

**ASSESSMENT OF THE RELATIVE IMPORTANCE OF SOURCES OF URBAN NOISE**

Estimates of the percentage of the US population exposed to day-night average sound levels in excess of 60 decibels indicate that while approximately 16 million people are exposed to aircraft noise and 3.6 million exposed to freeway noise, more than 59 million of the 134 million inhabitants of urban areas defined in the 1970 census are exposed to other sources of noise. The article presents a preliminary analysis of a survey of over 2000 people and rank orders several noise sources in terms of the annoyance reported by the respondents.

Galloway, WJ (Bolt, Beranek and Newman, Incorporated) *Noise Control Engineering* Vol. 9 No. 2, Sept. 1977, pp 68-73, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 176879

**FINAL ENVIRONMENTAL STATEMENT ON THE TRANSPORTATION OF RADIOACTIVE MATERIAL BY AIR AND OTHER MODES**

An assessment is presented of the environmental impact from transportation of shipments of radioactive material into, within, and out of the United States. It is intended to serve as background material for a review by the United States Nuclear Regulatory Commission (NRC) of regulations dealing with transportation of radioactive materials. The impetus for such a review results not only from a general need to examine regulations to ensure their continuing consistency with the goal of limiting radiological impact to a level that is as low as reasonably achievable, but also from a need to respond to current national discussions of the safety and security aspects of nuclear fuel cycle materials. Chapters are included on regulations governing the transportation of radioactive materials, radiological effects, transport impact under normal conditions, impacts of transportation accidents, alternatives, and security and safeguards. A standard shipments model is also included along with a demographic model, excerpts from federal regulations, data on Pu, Population dose formulas, a list of radioactive material incidents, accident analysis methodology, and an analysis of risk assessment sensitivity.

Nuclear Regulatory Commission Vol. 1 NUREG-0170, Dec. 1977, 343 pp

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

10 176917

**MAXIMUM VALUES FOR RAILWAY NOISE PRODUCTION; A PROPOSAL [Grenswaarden voor Spoorweggeleid; een Voorstel]**

The draft of the noise nuisance act allows maximum tolerable values of noise at the facades of houses alongside railway lines to be defined. This article provides a proposal on this matter. There are two basic questions: is it possible to develop maximum values for railway noise production based upon analogies with road traffic; and at what noise levels are the maximum values for l-max (the maximum noise level) and l-eq (the equivalent noise level) found. The author gives values dependent on the speed of the trains and the traffic intensity expressed in coaches per hour. [Dutch]

Nicolai, J *Verkeerskunde Analytic* Vol. 29 No. 1, Jan. 1978, pp 17-20, 2 Fig., 5 Phot., 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231883), Institute for Road Safety Research  
ORDER FROM: Dutch Touring Club ANWB, Wassenaarseweg 220, Box 2200, The Hague, Netherlands

PB 12805

10 177160

**EXPERIMENTAL STUDIES OF ACOUSTIC VIBRATION DAMPING COMPOSITE SYSTEMS WITH A VIEW TO THEIR APPLICATION IN THE DAMPING OF VIBRATIONS IN STEEL RAILWAY BRIDGES [Experimentelle Untersuchungen an Koerperschalldaempenden Verbundsystemen im Hinblick auf Schalldaempungsmassnahmen an Staehlernen Eisenbahnbruecken]**

This paper deals with the problem of abatement of noise from steel railway bridges through the application of large-area sandwich-type steel-plastic composite systems, which by damping acoustic flexural vibrations lead to substantially reduced sonic emission into the atmosphere. The mode of

operation of sound attenuating composite systems and the acoustic engineering problems involved in steel railway bridges are discussed. In addition, the requirements peculiar to bridge construction are considered, such as the fastening of the composite systems onto the steel structure, the corrosion behavior of the structure in the composite region, and the creep behavior of the composite systems under mechanical vibrating loads in the presence of temperature effects. [German]

Hanel, JJ Seeger, T *Stahlbau* Vol. 47 No. 1, Jan. 1978, pp 1-6, 16 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 177184

**STEERABLE STEEL WHEEL SYSTEMS AND WHEEL NOISE SUPPRESSION**

Steel wheel/steel rail vehicles have a long and successful history in transportation; however, the irritating screech noise generated while negotiating sharp curves is a characteristic of these systems. This paper shows how steerable wheel systems can reduce curving noise, determines the necessary accuracy for effective noise reduction. The most effective method to reduce squeal is to provide accurate steering, and some methods of improving steering systems are suggested.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Bleedorn, TG (Pullman-Standard Car Manufacturing Company); Johnstone, B  
Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-IA, 1977, 7 pp, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

10 177199

**ENVIRONMENTAL CONTROL OF WASHINGTON METRO**

A diagrammatic description of the heat flow within a station is presented. The design and functions of the air conditioning system in station and subway ventilation systems are discussed.

Greenspan, ME (Washington Metropolitan Area Transit Authority) *ASHRAE Journal* Vol. 20 No. 2, Feb. 1978, pp 30-35, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

10 178144

**ENERGY APPROACH TO ECOLOGICAL IMPACT ASSESSMENT**

This paper was prepared to educate the transportation planner/engineer in some of the rudiments of ecology and with the hope of systematizing current approaches to ecological assessment. Considerations of energy, or bio-energetics, have been found to be singularly applicable to transportation impact assessment. This method of evaluating the effects of environmental impacting factors on environmental elements is outlined herein. The method can be applied to the analysis of the ecological impact of all types of activities, and with particular pertinence to transportation. The energy theory is based on analysis of the amount of energy which is required by plants or animals or ecosystems or subsystems, to permit their growth or stability to continue. The numerical calculations involved permit quantification of impact effects of transportation facilities.

Cantilli, EJ (Polytechnic Institute of New York); Hair, M Cassin, JM Falcocchio, JC *Journal of Environmental Systems* Vol. 7 No. 3, 1977, pp 243-256

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

10 178151

**REDUCTION OF RAILWAY NOISE WITH COMPOSITE CONCRETE RAILS**

The author describes how noise due to high speed trains can be greatly reduced by the use of a suitable track structure. A rail with increased stiffness and mass allows the use of much more flexible mountings than are possible with conventional rails. Vibration of the ground and track structure, the most difficult type of sound to handle, is isolated at source. The track will hold a more precise alignment longer, and demands on the foundation are

less severe. The technique requires advances in concrete technology, but will make rail systems much quieter.

Halpenny, J (Department of Energy, Mines and Resources, Canada) *High Speed Ground Transportation Journal* Vol. 11 No. 2, 1977, pp 173-175, 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 10 178156

**REDUCTION OF EXHAUST SMOKE EMISSION FROM DIESEL PILE HAMMER**

Whenever a great number of piles must be driven, a free-piston type diesel pile hammer is more economical than other machines because it achieves faster driving, lower operating costs, greater profits, etc. However, the diesel pile hammer creates some problems associated with noise, vibration and air pollution. In this study, experts of Japan's Mitsubishi Heavy Industries Ltd. experimentally analyzed the cause of smoke formation in the diesel hammer, and developed some effective and inexpensive devices for smoke abatement. As a result, the company's new and improved diesel hammer has successfully met the California smoke emission standards in the United States.

Inenaga, N (Nagasaki Technical Institute, Japan); Kimura, K *Mitsubishi Heavy Industries Technical Review* Vol. 14 No. 3, Oct. 1977, pp 486-492, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 10 178279

**ANTI-NOISE BARRIERS [Schutzwände zur Schallenergievernichtung bei Verkehrsleerm]**

A discussion of the systems currently used for anti-noise barriers, such as reverberating or reflecting walls, or sound-absorbing walls which are not necessarily weatherproof. An innovation is sound-absorbing constructional elements made of calcinated or porous clay. Formulae, graphs and diagrams are used to show the problem of noise absorption and corresponding technical possibilities. [German]

Stieger, J *Schweizer Baublatt* Vol. 89 No. 13, 1978, pp 27-32, 9 Phot., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schueck Soehne AG, Bahnhofstrasse 24, CH-8803 Rueschlikon, Switzerland

## 10 178450

**RECIPROCATING ENGINES AND POLLUTION**

The author examines the nature, causes and effects of pollution from such engines and describes the methods by which emissions might be reduced.

Anand, WJD *Chartered Institute of Transport Journal* Vol. 25 No. 4, Apr. 1978, pp 68-72, 6 Fig., 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

## 10 178944

**DRAFT ENVIRONMENTAL IMPACT STATEMENT: ABANDONMENT OF RAIL LINES IN NORTHWEST MICHIGAN**  
No Abstract.

Sub-docket Nos. 5, 19 and 20.

Interstate Commerce Commission Docket No. AB18, 1977, 98 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications  
ORDER FROM: Interstate Commerce Commission, Office of Proceedings, Section of Energy and Environment, Washington, D.C., 20423

## 10 178945

**DRAFT ENVIRONMENTAL IMPACT STATEMENT: ABANDONMENT OF RAIL SERVICE IN SOUTHWESTERN WISCONSIN**

No Abstract.

Interstate Commerce Commission 1978, 137 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications  
ORDER FROM: Interstate Commerce Commission, Office of Proceedings, Section of Energy and Environment, Washington, D.C., 20423

## 10 179116

**HEALTH AND SAFETY IMPLICATIONS OF DIESEL LOCOMOTIVE EMISSIONS**

A review of the published literature was made to determine whether there are health and/or safety effects of long-term exposure to low concentrations of diesel emissions within the ranges reported in actual railroad operations. No consistent evidence was found linking low concentrations of diesel emissions to long-term health effects or short-term respiratory function. Evidence was found linking emissions to eye irritation. Interviews with union officials and operating crews, letters from union members, union file material, and miscellaneous locomotive and caboose inspection reports pointed to the conclusion that diesel emissions are not a widespread or frequent problem in the railroad environment.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development at the request of Naval Weapons Support Center, Crane, Indiana.

Peay, JM Sanders, MS  
Navy Personnel Research and Development Center, (NPRDC Code 311)  
FRA/ORD-78/18, Apr. 1978, 69 pp, 7 Tab., Refs.

Contract AR-74312

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

## 10 179130

**LOW FREQUENCY AND INFRASONIC NOISE IN TRANSPORTATION**

There has been very little spectral data reported at infrasonic frequencies for noise inside various modes of transportation, except for cars and trucks. This paper describes the results of an experimental program in which infrasonic levels were established inside aircraft, ships, trains and road vehicles.

Broner, N *Applied Acoustics* Vol. 11 No. 2, Apr. 1978, pp 129-146, Refs.

ACKNOWLEDGMENT: Applied Acoustics  
ORDER FROM: ESL

DOTL JC

## 10 179142

**PROBLEMS RELATED TO PROTECTION AGAINST NOISE CREATED BY PASSING TRAINS [Probleme des Laermschutzes an Schienenbahnen]**

In the German Federal Republic, federal law on protection against hazards states that the maximum tolerance for noise created by rail traffic may exceed the level for road traffic by a certain amount. This article discusses the problems created in connection with maximum noise levels for rail traffic and the possibilities of reducing the effects, taking cost factors into account. It can be seen that the decision to fix limits and compensation rights was made for political reasons. [German]

Girnau, G *Internationales Verkehrswesen* Vol. 30 No. 1, 1978, pp 15-20, 4 Tab., 3 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

## 10 179164

**REDUCING NOISE AND VIBRATION. RESULTS OF THE SCIENTIFIC AND TECHNICAL CONFERENCE [Bor'ba s sumom i vibracijej (S naucno-tehniceskoj konferencii)]**

The article reports on the conclusions of a conference on the problem of reducing noise and vibration in railway transport. The aim of the meeting was to coordinate the efforts of all the railway organizations to reduce noise and vibration, to take stock of results obtained, and to exchange views on the use of different technical means for this purpose. Over 100 papers were presented by specialists, the most interesting being "Noise of rolling stock", "Industrial noise", and "Oscillations and vibrations in rolling stock." [Russian]

Volkov, VI Danilov, DE *Elektricheskaya i Teplovoznaia Tiaga* No. 1, Jan. 1978, pp 39-41, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

11 117483

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE**

No abstract available.

Set includes PB-276145 thru PB-276149, RRIS 11 117484-117488 respectively, Bulletin 7802.

Pennsylvania University, Philadelphia, Department of Transportation  
July 1976, 381 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276144-SET/ST, DOTL NTIS

11 117484

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE. VOLUME I. COST AND LEVEL OF SERVICE COMPARISON**

This report describes findings of research performed during the first year of work under the Contract. The purpose of the first year of research was to evaluate the technical and economic feasibility of freight pipeline as an intercity transportation mode. The report for the first year consists of the following five separate volumes: Cost and level of service comparison; Freight pipeline technology; Cost estimating methodology; Demand analysis methodology; Impact assessment. Volume I considers methodology of analysis, cost comparison, the demand for freight pipeline, and major conclusions. The second year of research currently is being devoted to sharpening the concepts, broadening the areas of concern, and applying the tools of analysis developed in the first year to a specific origin-destination transportation corridor.

See also PB-276144, RRIS 11 117483, Bulletin 7802. Also available in set of 5 reports PC E11, PB-276 144-SET.

Zandi, I Allen, WB Morlok, EK Gimm, KK Plaut, T  
Pennsylvania University, Philadelphia, Department of Transportation  
Final Rpt. DOT-TST-76T/35, July 1976, 57 pp

Contract DOT-OS-50119

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276145/OST, DOTL NTIS

11 117485

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE. VOLUME II. FREIGHT PIPELINE TECHNOLOGY**

The purpose of this report is to provide a general assessment of the current state of the art in freight pipeline technology. A preliminary feasibility study was undertaken to evaluate the potential of applying this technology, as an innovation in providing freight transportation services. Topics discussed in the report include the following: Historical background; General pipeline systems information; Calculation of energy requirements; System characteristics; Overview of the future. The scope of the research on which this report is based, was limited to those classes of generic pipeline technologies that are relevant for transporting solid products via freight pipelines. For this reason, the discussion in this report does not include oil, gas, or water pipelines which are already well established technologies.

See also PB-276144, RRIS 11 117483, Bulletin 7802. Also available in set of 5 reports PC E11, PB-276 144-SET.

Zandi, I Gimm, KK  
Pennsylvania University, Philadelphia, Department of Transportation  
Final Rpt. DOT-TST-76T/36, July 1976, 79 pp

Contract DOT-OS-50119

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276146/8ST, DOTL NTIS

11 117486

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE. VOLUME III. COST ESTIMATING METHODOLOGY. PART A AND PART B**

In order to examine the feasibility of an intercity freight pipeline, it was necessary to develop cost equations for various competing transportation modes. This volume presents cost estimating equations for rail carload, trailer-on-flatcar, truck, and freight pipeline. Section A presents mathematical equations which approximate the fully allocated and variable costs

contained in the Interstate Commerce Commission (ICC) cost tables for rail carload, trailer-on-flatcar (TOFC) and truck common carrier inter-city freight movements. These equations were developed to enable the user to approximate the ICC costs quickly and easily. They should find use in initial studies of costs where exact values are not needed, such as in consideration of rate changes, studies of profitability, and in general inter-modal comparisons. Section B discusses the development of a set of engineering cost equations for pneumo-capsule pipeline. The development was based on an analysis of system components and can readily be extended to other types of pipeline. The model was developed for the purpose of a feasibility study. It employs a limited number of generalized parameters and its use is recommended when sufficient detailed and specific engineering information is lacking.

See also PB-276144, RRIS 11 117483, Bulletin 7802. Also available in set of 5 reports PC E11, PB-276 144-SET.

Warner, JA Morlok, EK Gimm, KK Zandi, I  
Laboratorio de Acustica e Sonica, Department of Transportation Final  
Rpt. DOT-TST-76T/37, July 1976, 121 pp

Contract DOT-OS-50119

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276147/6ST, DOTL NTIS

11 117487

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE. VOLUME IV. DEMAND ANALYSIS METHODOLOGY**

In order to determine the feasibility of intercity freight pipelines, it was necessary to determine whether sufficient traffic flows currently exist between various origins and destinations to justify consideration of a mode whose operating characteristics became competitive under conditions of high traffic volume. An intercity origin destination freight flow matrix was developed for a large range of commodities from published sources. A physical screening was then applied to yield a flow matrix which consisted of only goods which could be physically moved by pipeline. Rather than consider all possible origins and destinations, a high freight traffic density corridor between Chicago and New York and another between St. Louis and New York were studied. These corridors, which represented 18 cities, had single direction flows of 16 million tons/year. If trans-shipment was allowed at each of the 18 cities, flows of up to 38 million tons/year were found in each direction. These figures did not include mineral or agricultural products.

See also PB-276144, RRIS 11 117483, Bulletin 7802. Also available in set of 5 reports PC E11, PB-276 144-SET.

Allen, WB Plaut, T  
Pennsylvania University, Philadelphia, Department of Transportation  
Final Rpt. DOT-TST-76T/38, July 1976, 99 pp

Contract DOT-OS-50119

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-276148/4ST, DOTL NTIS

11 117488

**TRANSPORT OF SOLID COMMODITIES VIA FREIGHT PIPELINE. VOLUME V. IMPACT ASSESSMENT**

In order to establish the feasibility of the intercity freight pipeline, it was necessary to assess the impacts of various competing transportation modes. Time did not allow a full and quantitative analysis of impacts. Instead, these were identified and for each, as much data as was readily available was presented. Based on data presented in this report, it can be stated that, to the extent that a freight pipeline reduces truck traffic, it helps to reduce street congestion, noise, energy consumption, accidents and air pollution. As compared to rail, however, accident and noise reduction are certain, but the impact on energy consumption and air pollution depends on local conditions. The report of the second year of research will examine some of the impacts in more detail.

See also PB-276144, RRIS 11 117483, Bulletin 7802. Also available in set of 5 reports PC E11, PB-276 144-SET.

Zandi, I Gimm, KK  
Pennsylvania University, Philadelphia, Department of Transportation  
Final Rpt. DOT-TST-76T/39, July 1976, 25 pp

Contract DOT-OS-50119

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-276149/2ST, DOTL NTIS

11 165769

#### METHODOLOGY FOR IDENTIFYING URBAN TRANSPORTATION TECHNOLOGY ALTERNATIVES

This report reflects the view that the existing urban transportation planning process tends to ignore new transportation technologies (PRT, AGT, accelerated moving walkways, shared taxi). The information system described in this report aims to remedy this deficiency by specifying all the alternative technologies, new or old, that can satisfy a need. This system fits into the planning process after distribution. The intent herein is that this system be useful to transport planners and agencies. This report describes an information system which accepts as input a set of characteristics describing a particular transportation need and yields as output a list of transportation technologies capable of satisfying that need. A broad range of transportation need situations can be fed into this system. The system, however, is concerned with people movement rather than goods movement. The user of the system specifies the nature and extent of demand, as well as certain service requirements. A transportation technology is identified as suited to a particular need situation when the technology meets the demand and the service requirements, and does so at reasonable costs. The technologies identified by the system as suitable to a need are examined to select the one best alternative. This final selection process is not part of the system. The system consists of two tables. Their use is described and examples are presented in this report. The procedure used to develop the tables is discussed. This report recommends that a more comprehensive version of this system be developed. /FHWA/

Sponsored by the Urban Mass Transportation Administration, DOT.

Walbridge, EW  
Illinois University, Chicago, Urban Mass Transportation Administration,  
(IL-11-0008) Final Rpt. UMTA-IL-11-0008-77-2, Mar. 1977, 29 pp

Contract IL-11-0008

ACKNOWLEDGMENT: UMTA, NTIS  
ORDER FROM: NTIS

PB-271225/5ST, DOTL NTIS

11 166630

#### MATERIALS HANDLING BY SLURRY PIPELINES (CITATIONS FROM THE NTIS DATA BASE)

The bibliography contains citations on pipeline transportation of coal, oil, household wastes, sewage, mining, and dredging slurries. Studies on transport properties, fluid flow, hydraulic systems, pumps, and environmental impacts are included, as are economics and safety of slurry pipeline transportation. The majority of studies are energy related. (Contains 80 abstracts)

See also NTIS/PS-77/0660/9ST for Citations from the Engineering Index Data Base, report for 1970-June, 77.

Smith, MF  
National Technical Information Service Aug. 1977, 85 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-77/0659/1ST

11 166631

#### MATERIALS HANDLING BY SLURRY PIPELINES (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)

Worldwide research on slurry pipelines containing coal, crude oil, minerals, sand, gravel, metallic ores, industrial wastes, and municipal wastes are cited. Studies on pumps, pipes, fluid flow, hydraulics, and design are included. Characteristics of transported materials are covered. Underwater pipelines and underground pipelines are also covered. (Contains 168 abstracts)

Smith, MF  
National Technical Information Service Aug. 1977, 175 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-77/0660/9ST

11 168889

#### GUIDELINE FOR RIDE-QUALITY SPECIFICATIONS BASED ON TRANSPPO '72 TEST DATA

The study was undertaken to determine if new information suitable for use in Automated Guideway Transit (AGT) specifications of ride-quality could be derived from data taken during the tests of the four prototype AGT systems (the Bendix Dashaveyor, the Ford Motor AGT, the Rohr Monocab, and the Otis TTD system) at the Dulles International Airport in conjunction with TRANSPPO '72. The purpose of this work was to establish acceptable ride-quality levels for AGT vehicles and to define a means for measuring these motions. A set of acceleration and jerk values is presented for developing AGT ride-quality specifications in a universally accepted format for these measurements. In this report, the ride-quality acceleration measurements and the ride-jury comfort ratings that were recorded during the Post-TRANSPPO '72 test program have been examined for possible use in establishing standards for the ride-quality of AGT systems. The four TRANSPPO systems, the techniques used for making the ride-comfort tests, and data processing and analysis methods are described. Results are presented for the vibratory motions associated with travel at a constant speed over a straight guideway and for transient events associated with starting and stopping, traversing switch areas, and entering and exiting curves. Although the sample is small, and some anomalies are present, the TRANSPPO results were found to be a unique source of data for defining ride-quality standards.

See also Summary rept. dated Jun 73, PB-225 170.

Caywood, WC Donnelly, HL Rubinstein, N  
Johns Hopkins University, Laurel, Urban Mass Transportation Administration Final Rpt. UMTA-MD-06-0022-77-3, Oct. 1977, 46 pp

Contract DOT-UT-60042T

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-273272/5ST, DOTL NTIS

11 168985

#### COMPARISON OF EXPERIMENTAL AND THEORETICAL REACTION RAIL CURRENTS, RAIL VOLTAGES, AND AIRGAP FIELDS FOR THE LINEAR INDUCTION MOTOR RESEARCH VEHICLE

Measurements of reaction rail currents, reaction rail voltages, and airgap magnetic fields in tests of the Linear Induction Motor Research Vehicle (LIMRV) were compared with theoretical calculations from the mesh/matrix theory. It was found that the rail currents and magnetic fields predicted by the theory are within 20 percent of the measured currents and fields at most motor locations in most of the runs, but differ by as much as a factor of two in some cases. The most consistent difference is a higher experimental than theoretical magnetic field near the entrance of the motor, and a lower experimental than theoretical magnetic field near the exit. The observed differences between the theoretical and experimental magnetic fields and currents do not account for the differences of as much as 26 percent between the theoretical and experimental thrusts. (Color illustrations reproduced in black and white)

Elliott, DG  
Jet Propulsion Laboratory, National Aeronautics and Space Administration, Federal Railroad Administration Final Rpt. FRA-/ORD-77/33, 77-36, July 1977, 84 pp

Contract NAS7-100

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-274039/7ST

11 169122

#### SUPERCONDUCTING MAGNETS. VOLUME 2. SEPTEMBER 1976-SEPTEMBER 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)

The cited reports discuss research on materials studies, theory, design, and applications of superconducting magnets. Examples of applications include particle accelerators, MHD power generation, superconducting generators, nuclear fusion research devices, energy storage systems, and magnetic levitation. (This updated bibliography contains 122 abstracts, all of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0771, and NTIS/PS-75/636. See also Volume 1, 1964-Aug 76, NTIS/PS-77/0913, RRIS 11 169123; RRIS Bulletin 7802.

Reimherr, GW  
National Technical Information Service Oct. 1977, 127 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-77/0914/OST

**11 169123**  
**SUPERCONDUCTING MAGNETS. VOLUME 1. 1964-AUGUST 1976 (A BIBLIOGRAPHY WITH ABSTRACTS)**

The cited reports include research on materials studies, theory, design, and applications of superconducting magnets. Examples of the applications include particle accelerators, MHD power generation, superconducting generators, nuclear fusion research devices, energy storage systems, magnetic levitation, and bioinstrumentation. (This updated bibliography contains 246 abstracts, none of which are new entries to the previous edition.)

See also Volume 2, NTIS/PS-77/0914/OST, RRIS 11 169122; RRIS Bulletin 7802.

Reimherr, GW  
National Technical Information Service Oct. 1977, 251 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-77/0913/2ST

**11 169456**  
**A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV SUSPENSION ALTERNATIVES**

A linear, unconstrained perturbation model for the Tracked Ram Air Cushion Vehicle is developed. This model is the result of theoretical expressions for the TRACV which have been verified by wind tunnel and towed model tests. This model is varied to allow for passively suspended, two-degree-of-freedom winglets and for processor-controlled actuators on the same winglets. Optimization of the springs and dampers in the passive suspension is performed according to a performance index based on acceleration, winglet gap variation, and control power. Linear optimal control is applied to the active suspension to determine the optimal feedback gains using a similar performance index. The basic, passively suspended, and actively suspended vehicles are analyzed to determine root mean squared values for following: 1) vertical acceleration in the foremost and rearmost seats in the passenger cabin, 2) gap variation at the front and rear winglet areas, and 3) control deflection. The acceleration spectral density of each of the vehicle types is compared to the Urban Tracked Ram Cushion Vehicle standard. The active control system is analyzed to see if a reduced set of sensors may achieve acceptable ride quality based on the above measures. (Author)

Luhurs, RA  
Air Force Institute of Technology MS Thesis AFIT-CI-78-2, Sept. 1977, 125 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A046565/8ST

**11 173183**  
**ANALYZING INDIRECT IMPACTS OF ALTERNATIVE AUTOMATED-GUIDEWAY-TRANSIT SYSTEMS**

A computer methodology is described for analyzing at a sketch-planning level five types of indirect impact of automated guideway transit: right-of-way land consumption, community disruption, household and business displacements, aesthetics, and noise disruption. Application of the technique in a recent case study of dual-mode transit planning in Milwaukee is discussed. The methodology is also applicable to the preliminary analysis of other automated-guideway-transit systems. The procedures used in the inventory of potential link and station characteristics and in the analysis of network and corridor alternatives are reviewed. It is concluded that such analyses of neighborhood and environmental factors should be coordinated with other demand-and-supply-oriented, sketch-planning methodologies. /Author/

This article appeared in Transportation Research Record No. 634, Predicting and Measuring Impacts of Transportation Systems.

Lavery, LC Stuart, DG (Barton-Aschman Associates, Incorporated)  
*Transportation Research Record* No. 634, 1977, pp 13-20, 1 Fig., 8 Tab., 14 Ref.

ORDER FROM: TRB Publications Off

**11 173581**  
**CONTROL ASPECTS OF A TRACKED MAGNETIC LEVITATION HIGH SPEED TEST VEHICLE**

The control system of the high speed test vehicle KOMET is examined. The control hardware configuration consisting of digital computer, interface, sensors, magnet drivers and magnets is described. Control system synthesis is performed based on the state space approach and the classical approach of the z-transform. It leads to various control concepts, which are evaluated with regard to their responses to guideway irregularities, external forces and their sensitivity to plant parameter variations. Results from high speed testing are evaluated with regard to system responses, power requirements, and loss in magnetic force due to eddy currents.

Gottzein, E (Messerschmitt-Boelkow-Blohm GmbH); Brock, KH Schneider, E Pfeifferl, J *Automatica* Vol. 13 No. 3, May 1977, pp 205-223, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 173609**  
**A COMPARISON OF AUTOMATED PEOPLE MOVER AND ACCELERATING MOVING WALKWAY COSTS AND EFFECTIVENESS**

This paper compares passenger travel time performance, capacity, initial costs, operating costs, and maintenance requirements for accelerating moving walkways and automated people mover systems. The review is based on a case study involving the Satellite Transit System at the Seattle-Tacoma International Airport and an accelerating moving walkway network which might have been substituted for the Satellite Transit System. The results of the case study indicate substantial advantages for the accelerating moving walkway alternative insofar as initial cost and travel time performance are concerned. Capacities of the two systems are comparable. Total operating and maintenance costs for the accelerating moving walkway system are concluded to be possibly substantially less than and, at most, comparable to the operating and maintenance costs for the people mover system.

Bergmann, DR *Transportation Planning and Technology* Vol. 4 No. 2, 1978, pp 105-124

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

**11 173990**  
**HSST: A VIABLE ALTERNATIVE FOR RAPID AIRPORT-CITY CENTRE TRANSPORTATION**

A radically improved High Speed Surface Transport (HSST) system is well along in development by Japan Air Lines. Speeds of nearly 230 km/h have been achieved and the goal is 300 km/h. The HSST resembles an aircraft without wings or landing gear "flying" noiselessly only millimeters above a guideway. The levitation is produced by magnetic attraction and a linear induction motor is used to propel the vehicle. The next phase will be to build a system prototype and operational guideway with commercial use between Tokyo and the new Narita Airport now slated for 1980. With its high cruising speed it will cut time between Tokyo and Narita Airport to 15 minutes instead of two to three hours by expressway.

Hayashi, A (Japan Air Lines) *ICAO Bulletin* Vol. 33 No. 1, Jan. 1978, pp 21-24, 2 Phot.

ORDER FROM: International Civil Aviation Organization, 1080 University Street, Montreal 101, Quebec, Canada

**11 174035**  
**LEVITATION CHARACTERISTICS OF MAGNETICALLY SUSPENDED VEHICLES UTILIZING CONTINUOUS CONDUCTIVE SHEETS**

In the loop-type track, the magnetic field produced by ground coils is not uniform and therefore the lift force fluctuates as the train moves and the magnetic flux of the superconducting magnet fluctuates with time. Further, the manufacturing and installation cost of the ground coil is very expensive. To solve the difficulty an intensive study is being carried out in other countries on the sheet-type track which consists of continuous conductive sheets of aluminum or copper. In these analyses, it has usually been assumed that the sheet is infinitely or semiinfinitely wide. In this paper, the author replaces a ground sheet with finite width by a number of conductors with square cross section and arranges them in the running direction. Self- and mutual inductances of the conductors are taken into account in calculating



the levitation characteristics. Calculated levitation characteristics of the sheet-type track are compared with those of the loop-type track. It is found that there is a certain finite sheet width which maximizes the lift force.

Takahashi, T (Hitachi Limited) *Electrical Engineering in Japan* Vol. 96 No. 6, Nov. 1977, pp 97-105, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 174036

##### POLE FORCE OSCILLATIONS CAUSED BY ARMATURE SLOTS IN THE ACTIVE GUIDEWAY SYNCHRONOUS MOTOR [Polkraftschwankungen durch Ankernutung am Beispiel des Synchronen Langstatormotors]

Salient pole machines with a slotted armature develop periodic normal and tangential force oscillations causing magnetic noise. In the case of the active guideway synchronous motor, levitation and propulsion are affected. Here force oscillations are calculated by means of a finite difference method. Typical field and force distributions are presented. Suitable means for the elimination of pole force oscillations are discussed. [German]

May, H (Technical University of Braunschweig, West Germany);  
Mosebach, H Weh, H *Archiv fuer Elektrotechnik* Vol. 59 No. 5, 1977, pp 291-296

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 174189

##### POWER SPECTRAL DENSITY FOR CONSTRAINED LONG WAVELENGTH GUIDEWAY IRREGULARITIES

An equation for the power spectral density (PSD) of guideway irregularities that have been constrained to lie within a designated band is formulated. The equation enables guideway designers to control the upper bound on the long wavelength portion of the roughness PSD. The paper also provides insight into the accuracy of two quasi-linear modeling techniques for nonlinearities with random inputs.

Krishna, MB (Rockwool Industries, Incorporated); Hullender, D  
American Society of Mechanical Engineers n 77-WA/Aut-13, 1977, 8 pp, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 174191

##### PERIODIC MOTION OF VEHICLES ON FLEXIBLE GUIDEWAYS

Periodic motions of vehicles on flexible guideways are explored as candidate "test" motions for optimization studies where it is necessary to compare large numbers of designs under equivalent conditions. Exact and approximate methods are developed for identifying initial conditions that lead to periodic motions of single vehicles or many equally spaced vehicles. Using exact equations, fundamental questions regarding the nature of these motions are addressed (existence, uniqueness, stability, etc.). Approximate equations are developed to reduce the computational burden of examining large numbers of designs. It is shown that the assumptions inherent in the approximate equations are valid provided that vertical accelerations of the vehicles are sufficiently small.

Doran, AL (Hughes Aircraft Company); Mingori, DL *ASME Journal of Dynamic Systems, Meas and Control* Vol. 99 No. 4, Series G, Dec. 1977, pp 268-276, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 11 174370

##### CASE FOR SLURRY PIPELINES

The same basic economics is applicable to the transport of all fluids, and the only problem that many of us have is in simply recognizing that coal can be considered as such. Thus, coal in slurry form acts in a pipeline in a fashion almost identical to crude oil, and the economics are almost identical. All of the factors which have led us as a nation to transport petroleum by pipeline in preference to transport by railway tank cars exist with respect to the transport of coal. The better economics, the ease of handling, the lack of environmental impact of coal slurry lines, are all consistent with what we

have already learned with petroleum pipelines. Railroads have refused to allow slurry pipelines to cross their rights of way. Slurry pipeline companies are seeking rights of eminent domain in state legislatures and the federal congress and also questioning the railroads land titles (in some cases the railroads only have some form of easement). Further, the pipeline companies are committed to a strong public relations approach about railroad charges being more subject to inflation and "to what the traffic will bear" if there is no competition.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Haerle, PR

PLM, Incorporated Conf Paper 1977, pp 63-78

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

#### 11 174380

##### COAL PIPELINE ACT OF 1977

No Abstract.

Hearings before the Subcommittee on Mines and Mining and the Subcommittee on Indian Affairs and Public Lands of the Committee on Interior and Insular Affairs, House of Representatives, Ninety-Fifth Congress, First Session, on H.R. 1609. April 19, 25, and 26, 1977.

United States House of Representatives 1977, 451 pp, Refs.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

#### 11 174396

##### LOW-SPEED VEHICLE DYNAMICS AND RIDE QUALITY USING CONTROLLED D.C. ELECTROMAGNETS

The aim of this paper is to establish that attraction type systems, i.e. with controlled d.c. electromagnets, can be successfully employed for the suspension of urban transit vehicles, having speeds around 70 km/hr, without the aid of secondary suspension. A single degree of freedom suspension system is considered. The methods of characterizing track roughness and acceptable ride qualities are outlined and the ride characteristics that can be achieved through the design of feedback control systems are considered. Some of the basic factors which influence the performance and stability of the system are briefly discussed and some experimental results from a vibrating test suspension system are presented to illustrate the performance of the proposed system.

Jayawant, BV (Sussex University, England); Sinha, PK *Automatica* Vol. 13 No. 6, Nov. 1977, pp 605-610, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 175258

##### AUTOMATED GUIDEWAY TRANSIT WORKSHOP ON PERFORMANCE MEASURES, EVALUATION TECHNIQUES, AND GOALS HELD IN WASHINGTON, D.C. ON AUGUST 25, 1976

The Office of Technology Development and Deployment of the Urban Mass Transportation Administration (UMTA) is sponsoring projects that require the development of performance measures that will be used to evaluate the cost effectiveness of current and planned Automated Guideway Transit (AGT) systems. The purpose of this workshop was to identify performance parameters and develop measurement and computational techniques. The workshop centered around two specific objectives: (1) to review the status of parameter definitions; and (2) to review the techniques used for the measurement and evaluation of AGT system performance and establish significant trade-off items for further study. This workshop discussed the meaning, specification, and measurement of performance in AGT systems. The workshop was organized according to the following areas: Socio-Economic Studies Project-AGT Assessments; Preliminary Performance Measures for AGT Urban Deployability; Preliminary Performance Measures for the Systems Operations Studies; Advanced Mass Transit Simulator; and Trade-Off Studies for AGRT. This document contains the workshop presentation papers, discussion results, and list of attendees.

Roesler, WJ

Johns Hopkins University, Laurel, Urban Mass Transportation Administration, (UMTA-MD-06-0022) Final Rpt. UMTA-MD-



06-0022-77-4, Aug. 1976, 105 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277046/9ST, DOTL NTIS

#### 11 175260

##### DEVELOPMENT/DEPLOYMENT INVESTIGATION OF CABINTAXI/CABINLIFT SYSTEM

The study is an investigation of the Cabintaxi/Cabinlift Automated Guideway Transit (AGT) systems under development in the Federal Republic of Germany. It was conducted under a bilateral agreement between the U.S. Department of Transportation and the German Federal Ministry of Research and Technology, and was carried out jointly by The Transportation Systems Center (TSC) and The Studiengesellschaft Nahverkehr mbH (SNV), during the Fall of 1976 and Spring of 1977. The Cabintaxi/Cabinlift system is a technological concept designed for versatile application to a cross section of transportation needs. This report (which is available in both German and English) describes the overall design and development philosophy adopted by the manufacturers, the existing and planned technology and system concepts, the development experience to date, and the costs and performance levels achieved through several years of design refinement and test track experience. The purposes of this study are to: (1) gather and exchange information on Automated Guideway Technology to better understand the state of technological advancement and to obtain synergistic improvements for future development; (2) review problems and solutions encountered during the design, development, implementation, and operation of AGT systems; (3) obtain information on engineering, economic, operational performance, and public response which can be used in planning AGT systems; and (4) provide urban planners with information which will enable them to determine the applicability of AGT systems to their specific transportation problems.

Sponsored in part by Bundesministerium fuer Forschung und Technologie, Bonn (West Germany). Prepared in cooperation with Studiengesellschaft Nahverkehr m.b.H., Hamburg (West Germany).

Hobbs, VJ Heckelmann, W Patt, NG Hill, JH  
Transportation Systems Center, Studiengesellschaft Nahverkehr mbH,  
Urban Mass Transportation Administration, Bundesministerium fuer  
Forschung und Technologie, (UMTA-MA-06-0067) Final Rpt.  
DOT-TSC-UMTA-77-51, UMTA-MA-06-0067-77-2, Dec. 1977, 425 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277184/8ST, DOTL NTIS

#### 11 175282

##### EXPERIMENTAL INVESTIGATION OF AERODYNAMIC CHARACTERISTICS OF A TRACKED RAM AIR CUSHION VEHICLE

The results of an experimental and theoretical investigation of the longitudinal aerodynamic characteristics of a tracked ram air cushion vehicle are presented. Experiments have been conducted both in a wind tunnel with a model and section of guideway and with the same model propelled along a 300-foot guideway. Experimental results are presented for the dependence of the lift, drag, and pitching moment of the model on model height above the guideway and winglet gap, providing basic data necessary for the analysis of longitudinal stability and ride qualities of the concept. The stability derivatives determined from the moving-model experiments have agreed well with the wind tunnel results. A theory is presented which shows good agreement with the experimental results for the stability derivatives.

Curtiss, HC Putman, WF  
Princeton University, Transportation Systems Center Intrm Rpt.  
DOT-TSC-OST-77-35, AMS-TR-1318, Jan. 1978, 112 pp

Contract DOT-TSC-682

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277674/8ST, DOTL NTIS

#### 11 175502

##### ASSESSMENT OF OPERATIONAL AUTOMATED GUIDEWAY SYSTEMS- JETRAIL

The report is an assessment and evaluation of the Braniff International Airlines Jetrail system located at Love Field in Dallas, Texas, the first operational completely automated, demand-responsive, group rapid, in-

tra-airport transportation system. It connects a parking lot at the entrance to Love Field and the Braniff terminal with three-quarters of a mile of double-lane mono-rail and has ten suspended vehicles, a maintenance facility, and three stations. The system was intended to retain passengers in the face of increased congestion at Love Field. Jetrail operated successfully from April 1970 to January 1974, at which time Braniff moved to the new Dallas-Ft. Worth Regional Airport. Over six million passengers were carried 1.3 million miles during this period without a fatality or major mishap. The system did this in spite of the engineering novelty and early, low reliability of the propulsion and control system. The Jetrail system continues to be used as an engineering test-bed for a prototype linear induction motor propulsion system. This latter system, Astroglide, is being developed by PRT Systems Inc. Since the motor has no moving parts, it is more simple than the rotary motor and drive train of the Jetrail system. This report provides information on the Jetrail operational experience and the Astroglide prototype for transportation planners, designers, developers, and operators of AGT systems for intra-airport, urban, recreational, and freight applications.

Anagnostopoulos, G Wlodyka, RA Mitropoulis, IA Putkian,

J Kangas, RD

Transportation Systems Center, Urban Mass Transportation

Administration, (UMTA-MA-06-0067) Final Rpt. DOT-TSC-UMTA-77-55, UMTA-MA-06-0067-77-1, Dec. 1977, 276 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-278521/OST

#### 11 175909

##### TRACKED AIR CUSHION VEHICLE AND MAGNETIC LEVITATION (CITATIONS FROM THE NTIS DATA BASE)

The feasibility, design, and track dynamics of tracked air cushioned and magnetically levitated vehicles are investigated in these Government-sponsored research reports. (This updated bibliography contains 127 abstracts, 7 of which are new entries to the previous edition.)

Habercom, GE, Jr

National Technical Information Service Mar. 1978, 132 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0265/5ST

#### 11 176665

##### ELECTRODYNAMIC SUSPENSION AND LINEAR SYNCHRONOUS MOTOR PROPULSION FOR HIGH SPEED GUIDED GROUND TRANSPORTATION

A technically feasible high-speed (400-480 km/h) guided ground transportation system, based on the use of vehicle-borne superconducting magnets for electrodynamic suspension and guidance and for linear synchronous motor propulsion, has been defined as a future modal option for Canadian application. A variety of sophisticated analytical techniques have been developed to establish a comprehensive theoretical base for conceptual design studies. Analysis and design proposals have been validated by large-scale tests on a rotating wheel facility and by modelling system components and their interactions. Thirty tonne vehicles carrying 100 passengers operate over a flat-topped elevated guideway, which minimizes system down-time due to ice and snow accumulation and facilitates the design of turn-outs. A clearance of up to 15 cm is produced by the electrodynamic interaction between the vehicle-borne superconducting magnets and aluminum guideway strips. Propulsion and automatic system control is provided by the superconducting linear synchronous motor which operates at good efficiency (0.74) and high power factor (0.95). The vehicle is guided primarily by the interaction between the LSM field magnet array and flat null-flux loops overlying the stator windings in the guideway. The linear synchronous motor, electrodynamic suspension as well as levitation strip joints, parasitic LSM winding losses and limitations to the use of ferromagnetic guideway reinforcement, have been investigated experimentally on the test wheel facility. Careful consideration has been given to shielding the vehicle passenger compartment from stray fields exceeding 20 mT. Isochoric (sealed) dewars, rather than onboard closed cycle refrigeration, are proposed for a potentially lightweight reliable cryogenic support system. Conceptual design studies indicate the attractive features of this mode of operation, but detailed design and fabrication of tubular test dewars is necessary to demonstrate its operational feasibility. The use of a secondary suspension assures adequate dynamic stability, and good ride quality is

achieved by optimized passive components with respect to lateral modes and by an actively controlled secondary suspension with respect to vertical motion. It is concluded that the proposed Maglev system is a sufficiently promising approach to high-speed guided ground transport to warrant an assessment of its economic viability in Canada, the development of critical components (particularly lightweight superconducting magnets), and continued technical refinement.

Atherton, DL  
Canadian Institute of Guided Ground Transport Final Rpt.  
CIGGT-77-13, Sept. 1977, 264 pp, Figs., Tabs., 65 Ref., 8 App.

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

#### 11 176666

#### THE CANADIAN HIGH-SPEED MAGNETICALLY LEVITATED VEHICLE SYSTEM

A technically feasible high-speed (400-480 km/h) guided ground transportation system, based on the use of vehicle-borne superconducting magnets for electrodynamic suspension and guidance and for linear synchronous motor propulsion, has been defined as a future modal option for Canadian application. A variety of sophisticated analytical techniques have been developed to establish a comprehensive theoretical base for conceptual design studies. Analysis and design proposals have been validated by large-scale tests on a rotating wheel facility and by modelling system components and their interactions. Thirty tonne vehicles carrying 100 passengers operate over a flat-topped elevated guideway, which minimizes system down-time due to ice and snow accumulation and facilitates the design of turn-outs. A clearance of up to 15 cm is produced by the electrodynamic interaction between the vehicle-borne superconducting magnets and aluminum guideway strips. Propulsion and automatic system control is provided by the superconducting linear synchronous motor which operates at good efficiency (0.74) and high power factor (0.95). The vehicle is guided primarily by the interaction between the LSM field magnet array and flat null-flux loops overlying the stator windings in the guideway. The linear synchronous motor, electrodynamic suspension as well as levitation strip joints parasitic LSM winding losses and limitations to the use of ferromagnetic guideway reinforcement, have been investigated experimentally on the test wheel facility. Careful consideration has been given to shielding the vehicle passenger compartment from stray fields exceeding 20 mT. Isochoric (sealed) dewars, rather than onboard closed cycle refrigeration, are proposed for a potentially lightweight reliable cryogenic support system. Conceptual design studies indicate the attractive features of this mode of operation, but detailed design and fabrication of tubular test dewars is necessary to demonstrate its operational feasibility. The use of a secondary suspension assures adequate dynamic stability, and good ride quality is achieved by optimized passive components with respect to lateral modes and by an actively controlled secondary suspension with respect to vertical motion. It is concluded that the proposed Maglev system is a sufficiently promising approach to high-speed guided ground transport to warrant an assessment of its economic viability in Canada, the development of critical components (particularly lightweight superconducting magnets), and continued technical refinement.

Atherton, DL Belanger, PR Burke, PE Dawson, GE Eastham, AR Hayes, WF Ooi, BT Silvester, P Slemon, GR  
Canadian Institute of Guided Ground Transport Summary  
CIGGT-77-12, Sept. 1977, 67 pp, 36 Fig., 10 Tab., 67 Ref.

Contract OST5-0112

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

#### 11 176896

#### PASSIVE SUSPENSION DESIGN FOR A MAGNETICALLY LEVITATED VEHICLE

This paper presents a passive suspension designed to stabilize a magnetically-levitated vehicle, using both vertical and lateral suspension elements. The two-mass system is broken up into six subsystems, one for each degree of freedom, assumed to be independent. The suspension design is seen to be an attempt to obtain satisfactory dynamics for several subsystems simultaneously. Steady-state constraints are shown to be in conflict with optimal dynamical behaviour. Response to disturbances due to guideway roughness

and wind are considered, and it is shown that the suspension can attain, although marginally, satisfactory performance.

Belanger, PR Guillemette, R *ASME Journal of Dynamic Systems, Meas and Control* Vol. 99 No. 4, Dec. 1977, pp 277-283

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

#### 11 177167

#### POSSIBLE VARIANTS OF FREQUENCY AND VOLTAGE CONVERTERS TO SUPPLY POWER FOR LINEAR MOTORS ABOARD MAGNETICALLY SUSPENDED VEHICLES

[Vozmozhnye varianty preobrazovatelei chastoty i napryazheniya dlya pitaniya lineinogo dvigatelya na podvizhnom sostave]

The coefficient of increase of supply voltage depending on the control method is calculated for different variants of frequency and voltage converters. Calculations of mass and size indices of converters for the principal block diagrams of the supply system are carried out and recommendations on the choice of structure depending on the supply network type are given. [Russian]

Rotanov, NA Antyukhin, VM Nazarov, OS Suslova, KN *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 895-900

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177168

#### SELECTION OF THE MAGNETIC MATERIAL AND OPTIMIZATION OF MAGNETIC SYSTEMS FOR THE TRACK AND MAGNETICALLY SUSPENDED VEHICLE [Vybor magnitnogo materiala i optimizatsiya magnitnykh sistem dlya puti i ekipazha na magnitnom podveshivani]

It is noted that barium ferrite magnets are promising as material for magnetic suspension. The possibilities of using samarium-cobalt magnets are briefly considered. The dimensions of permanent magnets with rectangular cross-sections, ensuring minimal consumption of magnetic materials for the set values of the vehicle weight and of the working gap are determined. An evaluation of the cost of 1 km of magnets for a track designed for high-speed surface transport vehicles is carried out. [Russian]

Frishman, EM *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 892-894

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177169

#### EFFECT OF TRACK UNEVENNESS ON ELECTRODYNAMIC SUSPENSION DYNAMICS [O vliyani nerovnostei puti na dinamiku elektromagnitnogo podvesa]

Conditions of comfort assurance in a magnetic suspension system for high-speed transport vehicles with a single electromagnet are investigated. The case is considered when the system is subjected to the effect of periodic track unevenness due to the sagging of the trestle between supports and random geometric track unevenness. [Russian]

Nagorskii, VD Devyatova, NO *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 889-891

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177170

#### REPULSION-TYPE MAGNETIC LEVITATION SYSTEMS FOR HIGH SPEED TRANSPORT (SURVEY OF FOREIGN INVESTIGATIONS) [Sistemy magnitnoi livitsatsii ottalkivayushchego tipa dlya vysokoskorostnogo transporta (obzor zarubezhnykh issledovani)]

A survey of the main material published in non-Soviet press with regard to the repulsion-type magnetic levitation systems designed for high-speed surface transport is presented. Brief characteristics of the properties of the levitation systems is given and a classification of the suspension and guidance arrangements with superconducting coils is presented. The paper makes it possible to get an idea about the level of the research in this field outside the USSR. The problems of further investigations into the repulsion-type levitation systems and the dynamic properties of such vehicles are formulated. [Russian]

Vasil'ev, SV Kim, KI Matin, VI Mikirtichev, AA *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 882-888, 14 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177171

**ANALYSIS OF MAGNETIC SUPPORT SYSTEMS OF ELECTRIC TRACTION ARRANGEMENTS FOR HIGH SPEED SURFACE TRANSPORT AND SELECTION OF LINES OF FURTHER RESEARCH** [Analiz sistem magnitnykh opor ustroystv elektricheskoi tyagi vysokoskorostnogo nazemnogo transporta i vybor napravlenii dal'neishikh razrabotok]

Parameters of 15 types of magnetic supports are presented. Supports acting on the attraction of a dc electromagnet towards a ferromagnetic strip and on the repulsion forces, using superconducting loops, are recommended as promising for high-speed surface transport. The block diagram of a dc electromagnetic suspension system is analyzed. Systems of traction electric drives with linear asynchronous motors for high speed surface transport are considered. [Russian]

Shapovalenko, AG Gavilyuk, VA Zudin, PP *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 879-881

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177172

**SUPERCONDUCTING SOLENOIDS FOR SUSPENSION OF HIGH-SPEED MEANS OF SURFACE TRANSPORTATION** [Sverkhprovodyashchie solenoidy dlya podvesa vysokoskorostnykh nazemnykh transportnykh sredstv]

A critical review of the existing designs is given. Lines of research on the development of a transport solenoid in the USSR are discussed. It is proposed to select, for the time being, a coil 1 m long and 0.3 m wide with the magnetizing force of up to 0.3 MA as the laboratory model of the solenoid. [Russian]

Omel'yanenko, VI Bocharov, VI Dolgosheev, EA Usichenko, YG *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 875-878, 18 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177173

**SOME PROBLEMS OF THE THEORY OF ELECTRODYNAMIC SUSPENSION OF HIGH-SPEED SURFACE TRANSPORT (HSST) VEHICLES** [Nekotorye voprosy teorii elektrodinamicheskogo podveshivaniya ekipazhei vstn]

A method of calculation of the levitation characteristics of a HSST vehicle for superconducting magnets of an arbitrary shape is presented. Results of calculation of the lifting and breaking forces for current loops of rectangular and elliptical shape with different elongation of the figures are presented. Levitation characteristics of multiloop systems including the lifting and breaking force for a system of two coils with centers along and across the line of motion, with different current directions in the coil, are investigated. Data on levitation characteristics are given for a matrix consisting of a great number of loops. The entire study is carried out on the basis of a strict solution of Maxwell's equations. [Russian]

Treshchev, II Kochetkov, VM Yudakov, YV *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 871-874

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177174

**METHOD OF CALCULATION OF THE LIFTING AND BRAKING FORCES OF ELECTRODYNAMIC SUSPENSION WITH A DISCRETE TRACK STRUCTURE** [Metod rascheta sil pod"ema i tormozheniya elektrodinamicheskogo podvesa s diskretnoi putevoi strukturoi]

A new method of calculation of electromagnetic forces in electrodynamic suspension systems with a track structure in the form of closed loops is proposed. This method makes it possible to consider the suspension system taking into account the final effects, which is not possible with other known methods. [Russian]

Omel'yanenko, VI Bocharov, VI Dolgosheev, EA Naboka, VG Sergienko, AA *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 865-870

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177175

**MAGNETIC FIELD IN A HYBRID TYPE LEVITATION SYSTEM** [Magnitnoe pole v sisteme levitatsii gibridnogo tipa]

A hybrid system of levitation is considered. It is based on the use of electrodynamic forces of repulsion and attraction. For the case of the working tracks consisting of plates of infinite size, an exact solution is given for the magnetic field and electromagnetic forces. It is shown that, in particular cases, these solutions yield results that have been obtained earlier by other authors for a repulsion system of levitation. The problem considered has some relation to the problem of contactless suspension of a vehicle under low-speed conditions. [Russian]

Kim, KI Mikirtichev, AA *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 858-864, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177176

**PROBLEMS OF FUTURE PASSENGER TRANSPORT** [Problemy passazhirskogo transporta budushchego]

The results of the development of the passenger transport in the USSR in the 1971-1975 period are summed up and tasks of increasing the passenger turnover of the general-use transportation systems in the Tenth Five-Year Plan Period (1975-1980) by 23% are discussed. It is shown that it is necessary to develop fundamentally new types of rapid means of passenger transportation, in particular, all-weather high-speed surface transportation (HSST) with magnetic suspension of vehicles and linear electric traction motors. The task is posed to preface a mockup model of such a HSST vehicle and a proving ground for testing it by the year 1980. [Russian]

Shinkarev, NI *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 8, Aug. 1977, pp 843-845

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 11 177180

**MODERN DEVELOPMENT SYSTEMATIZATION FOR TRAIN CONFIGURATIONS WITH 300 KM/HR MAXIMUM SPEED**

[Modern Entwicklungssystematik fuer Zugkonfigurationen mit 300 km/h Hoechstgeschwindigkeit]

Problems associated with the development of a high speed tractive unit for 300 km/hr maximum speed, in West Germany, are considered. Questions of modern systematization of development are discussed. Such questions might be of interest for future vehicle projects. [German]

Luebke, D Plegler, J *Elektrische Bahnen* Vol. 48 No. 6, June 1977, pp 134-141, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 11 177191

**CONFERENCE RECORD--IEEE, IAS (INDUSTRY APPLICATIONS SOCIETY ANNUAL MEETING, 12TH, 1977**

This volume contains 188 papers divided into topical sessions sponsored by IEEE Committees. Topics include: harmonics and reactive power considerations, applications of converters to AC and DC motor controllers, and converter circuit and system analyses (Static Power Converter Committee); electric melting, controls, and general applications (Glass Industry Committee); electrophotography and electrostatic phenomena and applications (Electrostatic Processes Committee); DC drives, adjustable speed drives, and microprocessors Drives Committee; semiconductor device design, performance, reliability, recovery, packaging, protection, circuits and systems (Power Semiconductor Committee); and advanced transportation systems (Land Transportation Committee). Selected papers are indexed separately.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Institute of Electrical and Electronics Engineers Conf Paper n  
77CH1246-8-IA, 1977, 1181 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

11 178149

#### QUANTITATIVE ANALYSIS OF QUASI-SYNCHRONOUS PRT FLOW CHARACTERISTICS

A flow-modeller has been developed which is believed to reproduce, faithfully and inexpensively, guideway flow characteristics. The combined interactions of stations, interchanges and trip-demand, necessary for modelling fidelity, are accurately represented at the car-by-car level. A description of the flow-modeller is presented. Flow-modelling has been undertaken for a number of flow conditions with interchange control, in each case, being provided by each of a pair of highly efficient algorithms. The approach adopted was to fit, using the method of maximum likelihood, a number of likely empirical distributions to observed vehicle bunch and gap frequency data. A new flow-generator is proposed.

McGinley, FJ (Monash University, Australia) *High Speed Ground Transportation Journal* Vol. 11 No. 2, 1977, pp 129-156, 16 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 178153

#### OVERVIEW OF GUIDEWAY DESIGN

An evaluation of design objectives and procedures shows that elevated beamways of precast prestressed concrete and continuous at-grade pavements provide excellent guideway structures. Special design considerations are mentioned, and some examples of completed guideways are given.

LaNier, MW Dolan, CW *American Concrete Institute, Journal of* Vol. 75 No. 3, Mar. 1978, pp 73-77, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 178288

#### ELECTRODYNAMIC LEVITATION FOR HIGH SPEED OPERATION. REPORT ON STUDIES INTO VARIOUS SYSTEMS [Elektrodynamisches Schweben im Fernverkehr. Ergebnisdarstellung von Systemstudien]

No Abstract. [German]

Mandt, K *Siemens Review* Vol. 51 No. 12, 1977, pp 958-961, 1 Tab., 5 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Siemens-Aktiengesellschaft, Postfach 3240, 8520 Erlangen 2, West Germany

11 178486

#### FORM OF CIRCLE DIAGRAM FOR THE LINEAR INDUCTION MOTOR

A circle diagram is described for an idealized linear induction motor operating under constant-current conditions, with an iron-backed or air-backed conducting-sheet rotor. The diagram yields information about the performance of the machine, including normal force. Simplified expressions are derived relating complex input power, thrust and normal force. The theory is compared with the experimental results obtained from static-impedance tests on a linear induction motor.

Freeman, EM (Imperial College of Science & Technology, England); Lowther, DA *Institution of Electrical Engineers, Proceedings* Vol. 124 No. 11, Nov. 1977, 4 pp, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 178533

#### HIGH SPEED GUIDED GROUND TRANSPORT OF PASSENGERS-SUMMARY REPORT

The work reported here was carried out for the Transport and Road Research Laboratory as part of contracts CON/3711/52. The subject of the study was a comparison between the use of magnetic and other suspension

systems, in particular wheel-on-rail, for the transport of passengers at speeds higher than those currently used. The objectives of the study were firstly to investigate the technical problems associated with each technology, secondly to assess any differences in environmental impact and thirdly to make an economic comparison between the systems.

Linder, D

British Railways Board Research Department Tech Rpt. TR EDYN, Jan. 1978, 32 pp, 14 Fig.

ACKNOWLEDGMENT: British Railways

ORDER FROM: British Railways Board Research Department, Research and Development Division, Derby, England

11 178906

#### DESIGN AND PROPOSAL OF GUIDEWAY SUPERSTRUCTURES OF MIYAZAKI TEST TRACK

Design criteria, design methods and construction of the Miyazaki Test Track for magnetic levitation vehicles propelled by linear synchronous motors are described. Diagrams give details of the guideway.

Sato, Y Miura, S Umeda, S Iwasaki, I *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 7-10, 4 Fig., 1 Ref.

ACKNOWLEDGMENT: Japanese National Railways

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

11 178923

#### METHODS FOR COMPARATIVE ASSESSMENT OF HIGH-SPEED TRACKED VEHICLES

An equation is derived which takes account of the volume, weight and power balance and shows the growth laws for fast tracked vehicles. The influence of technical parameters on vehicle design can thus be presented in clearly arranged form. From this can be assessed objectives for the components and the technical latitude in the design. The model is suitable for the conversion of different designs to a common basis of comparison so as to show the purely technically-related differences. The results are described on the basis of the data for a contact-free, electro-magnetic-supported passenger vehicle with short-stator drive (EMS-KS), and are compared with the data of two rail vehicles--the DB's ET403 and the SNCF's TGV-001--and a design, the DB's RS-300. [German]

Feistkorn, J *Eisenbahntechnische Rundschau* Vol. 27 No. 3, Mar. 1978, 8 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

DOTL JC

11 178925

#### THE IRONLESS SYNCHRONOUS LINEAR MOTOR AS VEHICLE DRIVE IN A NOVEL HIGH-SPEED TRANSPORT SYSTEM

The authors describe the design, characteristics, mode of action and control of the ironless synchronous linear motor and also the experimental work on two test rigs. The test results confirmed both the motor theory evolved and the adopted method of calculation. Following the proof of the suitability of the motor as a drive unit in a high-speed transport system, the work is being continued in large-scale tests at the Erlangen circular route, and it is planned to carry out an investigation on the scale of a future commercial application. The tests take in experience in the fitting of the track coil, the control behaviour with the given vehicle dynamics, and the long-term behaviour of all motor components under the conditions of a full-scale test route. The results of the tests will add to the knowledge on the reliable and economical application of the ironless synchronous linear motor in a novel high-speed transport system of the future. The work on which this report is based was supported with funds from the Federal Ministry of Research and Technology within the framework of the research project TV7549. [German]

Duell, HJ *Eisenbahntechnische Rundschau* Vol. 27 No. 3, Mar. 1978, 7 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

DOTL JC

11 178955

**OUTLINE OF EXPERIMENTAL TRACK FACILITIES IN MIYAZAKI FOR LEVITATION LINEAR MOTOR CAR**

Since 1962 JNR has been developing a superconducting magnetic levitation system. In 1971, test cars combining the superconducting levitated system with linear induction motors and linear synchronous motors were tested successfully. In the meantime, electric power distribution systems and guideway structures were also studied. It was then recognized that large-scale experiments were necessary and in 1975, an experimental track 7 kms long, designed for 500 km/h tests was built in Miyazaki, in the Kyu-shu. Tests at a speed of 113 km/h have been successfully run on a 1.7 km segment of the track. This article describes this experimental test track.

Takeda, H (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 4, 1978, pp 7-9, 2 Fig.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

11 179123

**COMPARISON OF LINEAR INDUCTION MOTOR THEORIES FOR THE LIMRV AND TLRV MOTORS**

The Oberretl, Yamamura, and Mosebach theories of the linear induction motor are described and also applied to predict performance characteristics of the TLRV & LIMRV linear induction motors. The effect of finite motor width and length on performance predictions is examined for each theory. The edge and end effects are shown to play a dominant role in determining motor performance. The LIM thrusts predicted by the Oberretl, Yamamura, and Mosebach computer models are in reasonable agreement over most of the LIM speed range. The Oberretl theory tends to predict somewhat lower thrust values than the Yamamura and Mosebach theories; possible causes for the divergent thrust predictions are discussed. Computer listings for the Oberretl and Yamamura linear induction motor theories are presented in the appendix.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Stickler, JJ  
Transportation Systems Center Final Rpt. DOT-TSC-FRA-77-21, FRA/ORD-77/68, Jan. 1978, 132 pp, 39 Fig., 21 Tab., 8 Ref., 1 App.

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

11 179148

**EXPERIMENTAL STUDY OF THE INFLUENCE OF THE TEMPERATURE ON THE LEVITATION HEIGHT IN SYSTEMS USING PERMANENT MAGNETS [Experimentelle Untersuchungen des Temperatureinflusses auf die Schwebehohe von Permanentmagnet-Schwebesystemen]**

A description of experiments completed. They show that between 0 and 120C, the levitation height varies in linear fashion and inversely to the temperature. The variation is less than 0.1 mm/k. Below 0C, irreversible losses occur according to the levitation height. Recommendations are given in case of failure, and the influence of the magnet material is discussed. [German]

Guenther, J *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 24 No. 4, 1977, pp 725-730, 5 Fig., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

11 179161

**TECHNICAL ALTERNATIVES FOR A MAGLEV SYSTEM**

No Abstract.

Leonhard, W *Electronics and Power* Vol. 24 No. 4, Apr. 1978, pp 293-296, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

11 179282

**TLV STATUS REPORT**

The worldwide status of Tracked Levitated Vehicle (TLV) technology and an assessment of its development, sponsored by the Advanced Technology Program within the Office of Research and Development in FRA, is presented here. This report along with a TLV Technology Workshop sponsored by the Office of University Research represent a continuing and coordinated effort by the Department of Transportation to keep abreast of the state of worldwide developments in this technology. The first chapter, entitled "An Overview of Worldwide Research Programs of Noncontacting Suspensions for Ground Transportation Vehicles", describes various maglev and air cushion suspension test facilities in use throughout the world. The second chapter, entitled "TLV Technology Status Report" discusses the status of the overall technology, in the judgment of MITRE/METREK. The purpose of this report is to place the worldwide research efforts in perspective as they address the outstanding technical problems as a whole. This will provide the reader with a tool for assessing target areas for future research which complement the ongoing worldwide efforts. This report uses the SI (metric) units.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Katz, R  
Mitre Corporation Tech Rpt. FRA/ORD-78/01, MTR-7599, Oct. 1977, 142 pp, 52 Fig., 37 Ref.

Contract DOT-FR-54090

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-279845/AS, DOTL NTIS, DOTL RP

11 179283

**VIBRATION ASPECTS OF RIDE QUALITY MODELING FOR THE DOT PTACV--THEORY AND EXPERIMENT**

An important aspect of passenger ride comfort in a transportation vehicle is the acceleration level of the passenger cabin. In order to incorporate ride quality into the design process of such vehicles, it is necessary to have reasonably validated analytical models to predict the acceleration levels at frequencies which affect passenger ride comfort. The purpose of this report is to discuss the suitability of analytical models used to predict the heave acceleration in the passenger cabin of The Department of Transportation's Prototype Tracked Air Cushion Vehicle (PTACV). The basis of this evaluation is a comparison of theoretical predictions from an analytical model, typical of those in common usage today, with measured response accumulated during testing of the PTACV on its test track.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Katz, R  
Mitre Corporation Tech Rpt. FRA/ORD-78/02, MTR-7692, Dec. 1977, 51 pp, 29 Fig., 2 Tab., 9 Ref.

Contract DOT-FR-54090

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-279846/AS, DOTL NTIS, DOTL RP

11 179284

**PHASE IIIC--TEST & DEMONSTRATION PROTOTYPE TRACKED AIR CUSHION VEHICLE (PTACV)**

A six year multi-phased program for design, development and test of a prototype tracked air cushion vehicle was culminated in a six month test and demonstration under Phase IIIC. Descriptions of the various major sub-systems are presented with design and operational performance data. Technical data covering test objectives, descriptions and results are furnished on a wide variety of functional assemblies, subsystems and performance conditions. Physical characteristics were measured for accelerations, braking, aerodynamic drag, ride comfort, acoustical quality, reliability and maintainability performance. System description and proposed system applications were surveyed and presented to selected government representatives.

Prepared for U.S. Department of Transportation, Federal Railroad Administration. Related information in report deliverables under Phases I through IIIB of contracts DOT-UT-10031; and DOT-FR-40022.

Smith, AK Dallas, J Dynes, R Stott, R Samusson, L

Rohr Industries, Incorporated Final Rpt. FRA/ORD-78/03, Nov.  
1977, 215 pp, Figs., Tabs., 15 Ref., 2 App.

Contract DOT-FR-54089

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-279970/AS, DOTL NTIS, DOTL RP

12 053279

**AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS.  
TESTS CARRIED OUT IN THE LABORATORY AND IN  
OPERATING CONDITIONS FOR SELECTING OPTIMUM  
ACOUSTIC WARNING SIGNALS**

This report describes tests carried out in the laboratory and in service conditions concerning the perceptibility of acoustic warning signals in the presence of the severe background noise produced at track worksites. The tests in the laboratory were carried out with several forms of signals, allowing the influence of the following factors to be studied: dissonance, types of signal, frequency spectra and their bandwidth and centre frequency. Arising from the laboratory studies, selected signals were investigated under operating conditions at the threshold of perception. Tests were also made above the threshold of perception using pneumatic signal generators which had been specially manufactured to produce warnings of defined types.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways A 124/RP 8, Oct. 1977, 66 pp, 40 Fig., 44 Tab., 4 App.

ACKNOWLEDGMENT: UIC

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12 117477

**TRANSPORTATION SAFETY INFORMATION REPORT. JULY,  
AUGUST, AND SEPTEMBER 1977 QUARTERLY HIGHLIGHTS**

The quarterly publication is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report is a discussion on Aircraft Postcrash Protection and an Intermodal Safety Affairs article on Occupant Protection Systems in various other modes.

See also NTISUB/C/224-002. Paper copy also available on subscription, North American Continent price \$30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-TES-77-3, Dec. 1977, 80 pp

ACKNOWLEDGMENT: NTIS

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NTISUB/C/224-003, DOTL NTIS

12 168633

**SPENT FUEL TRANSPORTATION PROBLEMS**

In this paper, problems of transportation of nuclear spent fuel to reprocessing plants are discussed. The solutions proposed are directed toward the achievement of the transportation as economic and safe as possible. The increase of the nuclear power plants number in the USSR and the great distances between these plants and the reprocessing plants involve an intensification of the spent fuel transportation. Higher burnup and holdup time reduction cause the necessity of more bulky casks. In this connection, the economic problems become still more important. One of the ways of the problem solution is the development of rational and cheap cask designs. Also, the enforcement in the world of the environmental and personnel health protection requires to increase the transportation reliability and safety. The paper summarizes safe transportation rules with clarifying the following questions: the increase of the transport unit quantity of the spent fuel; rational shipment organization that minimizes vehicle turnover cycle duration; development of the reliable calculation methods to determine strength, thermal conditions and nuclear safety of transport packaging as applied to the vehicles of high capacity; maximum unification of vehicles, calculation methods and documents; and cask testing on models and in pilot scale on specific test rigs to assure that they meet the international safe fuel shipment rules. Besides, some considerations on the choice and use of structural materials for casks are given, and problems of manufacturing such casks from uranium and lead are considered, as well as problems of the development of fireproof shells, control instrumentation, vehicles decontamination, etc. All the problems are considered from the point of view of normal and accidental shipment conditions. Conclusions are presented. (Atomindex citation 08:303384)

Available in microfiche only. In Russian, International conference on nuclear power and its fuel cycles, Salzburg, Austria, 2 May 1977,

3.3.-T.1./02 4 tables, 4 figs. U.S. Sales Only.

Kondrat'ev, AN Kosarev, YA Yulikov, EA

International Atomic Energy Agency CONF-770505-129, 1977, 8 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

IAEA-CN-36/316

12 169010

**RADTRAN: A COMPUTER CODE TO ANALYZE  
TRANSPORTATION OF RADIOACTIVE MATERIAL**

A computer code is presented which predicts the environmental impact of any specific scheme of radioactive material transportation. Results are presented in terms of annual latent cancer fatalities and annual early fatality probability resulting from exposure, during normal transportation or transport accidents. The code is developed in a generalized format to permit wide application including normal transportation analysis; consideration of alternatives; and detailed consideration of specific sectors of industry. (ERA citation 02:045144)

Taylor, JM Daniel, SL

Sandia Laboratories, Energy Research and Development Administration

Apr. 1977, 96 pp

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

SAND-76-0243

12 169075

**EXECUTIVE SUMMARY OF SAFEGUARDS SYSTEMS  
CONCEPTS FOR NUCLEAR MATERIAL TRANSPORTATION**

The U.S. Nuclear Regulatory Commission contracted with System Development Corporation to develop integrated system concepts for the safeguard of special strategic nuclear materials (SSNM), which include plutonium, uranium 233 and uranium 235 of at least 20 percent enrichment, against malevolent action during interfacility transport. This executive summary outlines the conduct and findings of the project. The study was divided into three major subtasks: (1) The development of adversary action sequences; (2) The assessment of the vulnerability of the transport of nuclear materials to adversary action; (3) The development of conceptual safeguards system design requirements to reduce vulnerabilities.

Baldonado, OC Kevany, M Rodney, D Pitts, D Mazur, M

System Development Corporation, Nuclear Regulatory Commission Final Rpt. NUREG-0334, Sept. 1977, 16 pp

Contract AT(49-24)-0333

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273000/OST

12 169215

**EFFECTIVENESS OF AUDIBLE WARNING DEVICES ON  
EMERGENCY VEHICLES**

The purpose of the study was to examine the effectiveness of audible warning devices (AWD's) on emergency vehicles in terms of aural detectability. Community noise intrusion and opportunities for AWD optimization were also investigated. Measurements were made of sirens, automobile insertion loss, and human detection performance in real-life and simulated situations. Warning effectiveness distances were calculated for three representative situations: (1) Rural environment with vehicle windows closed and radio on; (2) urban environment with vehicle windows open and radio off; and (3) suburban environment with vehicle windows open and radio off. It was concluded that reliance on present audible warning devices to warn drivers in traffic is not justified. To be loud enough to warn in all ordinary circumstances, the sound level of audible warning devices would have to be increased greatly--producing intolerable community noise. Present audible warning devices can be improved; more uniform horizontal forward radiation and higher frequency sounds would increase detectability. The analysis procedure can provide the basis for an objective measure of audible warning device performance.

Prepared by Bolt, Beranek and Newman, Inc., Cambridge, Mass.

Potter, RC Fidell, SA Myles, MM Keast, DN

Society of Automotive Engineers, Bolt, Beranek and Newman,

Incorporated, Transportation Systems Center Final Rpt. DOT-TSC-OST-77-38, Aug. 1977, 150 pp

Contract DOT-TSC-868  
ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-274567/7ST, DOTL NTIS

12 169236

#### FIRE PERFORMANCE OF INTERMODAL SHIPPING CONTAINERS

During the week of 19 July 1976, a full-scale fire test series was performed at the U.S. Coast Guard Fire and Safety Test Detachment to examine the potential fire hazards of intermodal shipping containers. The three-part test series was conducted on Little Sand Island in Mobile Bay, Alabama. The first sequence of tests were planned to evaluate whether a fire originating within a sealed intermodal container could burn through the container shell. The second task of the test series was to determine the effects of an exterior pool fire exposure on a single level of containers, and the final task was to evaluate the effects of an exterior pool fire exposure on a stack of containers. Standard 8 foot by 8 foot by 20 foot steel, aluminum and fiberglass-reinforced plywood shipping containers were tested. The interior fire tests utilized two 30-pound wood cribs constructed of white fir and 2 gallons of naphtha as a fuel source. For the exterior fire tests, a 29 x 24 foot steel test pan containing JP-5 was constructed beneath the container stack. Standard container stacking and lashing arrangements were used for all tests. (Author)

Eberly, R.  
United States Coast Guard Final Rpt. CGR/DC-23/77,  
USCG-D-62-77, Oct. 1977, 62 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A047513/7ST

12 169238

#### EXPLOSION HAZARDS ASSOCIATED WITH SPILLS OF LARGE QUANTITIES OF HAZARDOUS MATERIALS. PHASE II

This report documents the results of Phase II of a program aimed at quantifying the explosion hazards associated with spills of large quantities of hazardous material such as liquefied natural gas and liquefied petroleum gas. The principal results of this phase of the work are: a quantitative empirical description of the burning behavior in fuel-air mixtures, an examination of flame acceleration processes, the observation that, in 17 large scale burn tests, no transition to detonation occurred, and that methane-air mixtures cannot be detonated with moderate size solid explosive boosters. (Author)

See also Phase I, AD-A001242, RRIS 12 080426; RRIS Bulletin 7501.

Lind, CD Whitson, JC  
Naval Weapons Center Final Rpt. USCG-D-85-77, Nov. 1977, 40 pp

Contract DOT-CG-34095-A

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A047585/5ST

12 169279

#### MANPOWER ANALYSIS IN TRANSPORTATION SAFETY

This project provides a manpower review of national, state and local needs for safety skills, and projects future manning levels for transportation safety personnel in both the public and private sectors. Survey information revealed that there are currently approximately 121,000 persons employed directly in transportation safety occupations within the air carrier, highway and traffic safety, motor carrier, pipeline, rail carrier, and marine carrier transportation industry groups. The projected need for 1980 is over 145,000 of which over 80% will be in highway safety. An analysis of transportation tasks is included, and shows ten general categories about which the majority of safety activities are focused. A skills analysis shows a generally high level of educational background and several years of experience are required for most transportation safety jobs. An overall review of safety programs in the transportation industry is included, together with chapters on the individual transportation modes.

Bauer, CS Bowden, HM Colford, CA DeFilipps, PJ Dennis, JD  
Florida Technological University, Department of Transportation Final  
Rpt. DOT/TST-77/40, May 1977, 359 pp

Contract DOT-OS-40020

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275445/5ST, DOTL NTIS

12 172010

#### CONCLUSIONS OF PROGRAM OPERATING TESTS [Aussagen von Betriebstests von Programmen]

The author refers to various work carried out on this subject and proposes mathematical research into the duration and number of tests used to determine those indices which are of importance in deciding whether or not a system offers a sufficient degree of safety. [German]

Ehrenberger, W *Eisenbahntechnische Rundschau* Vol. 26 No. 11, Nov. 1977, pp 771-775, 2 Fig., 1 Tab., 2 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

12 172024

#### HUMAN ERROR

Investigation reveals that product design should consider that products can be engineered to cope with humans--rather than vice versa. The author stresses that management systems, tools, equipment and facilities should be improved so as to make less likely errors that can result in injury or damage. This can be more cost effective than programs that seek to motivate people to be safer.

Allison, W (Gilbert/Commonwealth Companies) *National Safety News* Vol. 117 No. 1, Jan. 1978, pp 54-56, 2 Fig., 1 Phot.

ACKNOWLEDGMENT: National Safety News  
ORDER FROM: National Safety Council, 444 North Michigan Avenue, Chicago, Illinois, 60611

12 172026

#### LIST OF THE MAIN DANGEROUS GOODS AND SUBSTANCES CARRIED BY RAIL, AND FIRE FIGHTING METHODS [Perecen' osnovnykh opasnykh materialov i vescestv, perevozymykh po zeleznym dorogam, i sredstva ih tusenija]

No Abstract. [Russian]

Belan, MS *Ohrana Truda* Vol. 4 No. 67, UIC Cat. 25 N38, 1977, 40 pp

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

12 172642

#### REPORT ON RESEARCH OF ACCIDENT CONTROL SYSTEM

Research started in 1973 at the request of the Japanese National Railways with a view to establishing the standards for an accident control system in order to prevent train accidents in the existing lines caused by natural calamities.

*Permanent Way* Vol. 19 No. 1-2, Aug. 1977, pp 1-36

ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashi-ueno, Taito-ku, Tokyo 110, Japan

DOTL JC

12 173421

#### FURTHER DEVELOPMENT OF THE "SIFA 66" ELECTRONIC SAFETY SYSTEM [Weiterentwicklung der elektronischen Sicherheitsfahrerschaltung "SIFA 66"]

Description of a new electronic, automatic safety system originating with the "Sifa 66" system. [German]

Loose, J *Schienenfahrzeuge* Vol. 21 No. 10, 1977, pp 336-338, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany



12 173437

**PROCEEDINGS OF THE 11TH MEETING OF THE SCIENTIFIC COMMITTEE FOR TRACK AND OPERATIONS HELD IN BRUNSWICK ON 9 AND 10 MARCH 1977 ON THE IMPORTANCE OF THE THEORY OF RELIABILITY FOR TRANSPORT SYSTEMS SAFETY [Niederschrift ueber die 11. Sitzung des Wissenschaftlichen Ausschusses fuer Bau-und Betriebstechnik (WAAB) am 9. und 10. Maerz 1977 in Braunschweig: Bedeutung der Zuverlaessigkeitstheorie fuer die Sicherheit von Verkehrssystemen]**

Sitzung des Wissenschaftlichen Ausschusses fuer Bau-und Betriebstechnik (WAAB) am 9. und 10. Maerz 1977 in Braunschweig: Bedeutung der Zuverlaessigkeitstheorie fuer die Sicherheit von Verkehrssystemen]

No Abstract. [German]

Pierick, K. Gayen, JT  
German Federal Railway DB: Dok 4663, 1977, 8 pp, 5 Phot., 31 App.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: German Federal Railway, Friedrich-Ebert-Anlage 43-44, 6 Frankfurt am Main, West Germany

12 173582

**FIRE PROTECTION SYSTEMS ON (WMATA) METRO**

Smoke and fire detection, fire alarm and fire fighting systems for the Washington Metropolitan Area Transit Authority (WMATA) Mass Rapid Transit System, including some alternate fire fighting system designs, are presented. A combined rate-of-rise/fixed temperature fire detector is used in areas where rapid temperature changes are abnormal. Fixed temperature fire detectors are used in the other areas requiring protection. The below grade passenger stations have a wet pipe standpipe system. This system also includes a dry pipe and siamese connection to increase the volume and pressure of the water above the nominal city water pressure. The aerial and surface stations have a dry pipe standpipe system. All passenger station standpipe systems provide water to a hose valve within each fire equipment cabinet and to each angle hose valve located under manhole covers on the platform. The train tunnels also have a dry standpipe system.

Ell, WM (De Leuw, Cather and Company) *ASCE Journal of Transportation Engineering* Vol. 104 No. 1, Jan. 1978, pp 69-74

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

12 173595

**SOME ASPECTS OF FIRE BEHAVIOR OF RUNNING COACH IN A TUNNEL**

Behavior of a fire in a passenger coach passing through a tunnel was investigated in the Sarutoge tunnel. The effect of the heat from this fire on the tunnel was also studied. It was found that a train with a fire in a car could be kept running for a considerable distance in a tunnel without any danger to passengers if passengers were evacuated an appropriate distance in the train. No danger to tunnel facilities would result from a burning coach.

Kida, H *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Rpt No. 1010-76, Dec. 1977, pp 168-173, 12 Fig., 1 Tab., 3 Ref.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

12 173607

**SOME MYTHS ON HAZARDOUS MATERIALS**

This paper describes some myths about hazardous materials, that is, deeply ingrained beliefs that are not wholly true. Thus many people believe that explosive mixtures are not dangerous if everything possible has been done to remove known sources of ignition, that non-sparking tools are useful, that if a combustible gas detector reads zero it is safe to introduce a source of ignition, that a pressure of 10 pounds is too small to cause injury and that ton for ton, toxic gases cause more harm than flammable gases.

Kletz, TA *Journal of Hazardous Materials* Vol. 2 No. 1, Dec. 1977, pp 1-10

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

12 174550

**SAFETY ANALYSIS REPORT FOR PACKAGING (SARP):  
ATMX-500 RAILCAR NUCLEAR PACKAGING**

A Safety Analysis Report for Packaging (SARP) is described that makes available to all potential users the technical specifications and limits

pertinent to the modification and use of the ATMX Railcars for which the Department of Transportation has issued Special Permit No. 5948. The SARP includes discussions of structural integrity, thermal resistance, radiation shielding and radiological safety, nuclear criticality safety, and quality control. Much of the information was previously published in a similar report. A complete physical and technical description of the package is presented. The packaging consists of a specially modified ATMX Series 500 Railcar loaded with DOT Specification steel drums or fiberglass coated plywood boxes. The results of the nuclear criticality safety analysis provide the maximum quantities of each fissile isotope which may be shipped as Fissile Class I in 30-and 55-gal drums. A limit of 5 g/ft exp 3 was established for wooden boxes. Design and development considerations regarding the packaging concept and modification of the ATMX-500 Railcar are presented. Tables, dimensional sketches, sequential photographs of the structural modifications, technical references, loading and shipping guidelines, and results of Mound Laboratory's experience in using this container are included. An internal review of this SARP was performed in compliance with the requirements of ERDA Manual Chapter 5201-Part V. (ERA citation 02:057277)

Griffin, JF Edling, DA Blauvelt, RK  
Mound Laboratory, Energy Research and Development Administration  
July 1977, 46 pp

Contract EY-76-C-04-0053

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

MLM-2428

12 174752

**FIRE DETECTION, EXTINGUISHMENT, AND MATERIAL TESTS FOR AN AUTOMATED GUIDEWAY TRANSIT VEHICLE**

Tests were conducted in a simulated automated guideway transit vehicle to determine the effectivity of a Halon 1301 fire-extinguishing system during various types of fires, evaluate a photoelectric and an ionization fire detection system, and compare various materials under full-scale fire conditions. A portion of a school bus (770 cubic feet) supplied with an airflow system (300 cubic feet per minute--225 recirculated and 75 fresh air) was used as the test article. Smoke density, temperature, carbon monoxide, and Halon 1301 concentrations were monitored throughout the tests. Hydrogen fluoride (HF) samples were taken during the fire extinguishing tests. The noise level associated with the activation of the explosive charge and release of the compressed gas from the 1301 reservoir is high. In the experiment, levels of 120-132 decibel (Absolute) were recorded. There was no attempt to muffle this noise level for passengers in an enclosed compartment, since this was beyond the scope of the report.

Hill, RG Johnson, GR  
National Aviation Facilities Experimental Center Final Rpt. FAA/-NA-76-52, Nov. 1977, 28 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A047789/3ST, DOTL NTIS

12 175246

**FEASIBILITY STUDY OF RESPONSE TECHNIQUES FOR DISCHARGES OF HAZARDOUS CHEMICALS THAT FLOAT ON WATER**

An in depth evaluation was conducted of potential response techniques for ameliorating the vapor hazard from discharges of hazardous chemicals that float on water. Fifteen techniques were selected on the basis of their performance in similar situations, such as oil spills and hazardous chemical production or handling. Six of these techniques were judged to be feasible methods for achieving the objectives of this program. Vaporization rate reduction, the objective of Task I, could be achieved by using surfactant films, foams or sorbents. Vapor concentration reduction, the objective of Task II, could be achieved by encapsulation. Vapor flammability reduction, the objective of Task III, could be achieved by using foams and water aerosols. Techniques utilizing particulate cover, 'foamed-in-place' urethane layer, gels and cryogenic cooling were defined as having potential for successful utilization. All techniques were judged to need some further development or assessment. Recommendations for specific programs are presented. (Author)

Greer, JS  
MSA Research Corporation Final Rpt. MSAR-76-125, USCG-D-56-77, Oct. 1976, 228 pp

Contract DOT-CG-51870-A  
 ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

AD-A049921/OST

#### 12 175277

### MULTIDISCIPLINARY ACCIDENT INVESTIGATION SCHOOL BUS LOCOMOTIVE-CABOOSE COLLISION, LAFAYETTE, OREGON

The report documents the activities and findings of the University of Southern California Multidisciplinary Accident Investigation Team with respect to a train versus school bus collision in Lafayette, Oregon, Wednesday, September 8, 1976. The collision occurred when the school bus stopped at a stop sign posted at the tracks, then proceeded across the tracks directly into the path of an oncoming locomotive-caboose combination. The collision was apparently caused by improper visual search of the tracks by the bus driver, but environmental factors contributed to a decrease in the pre-crash conspicuity of the train. The impact caused the bus to tilt to the right; the train then rotated the bus about its rear wheels and dragged the bus 30 feet. The bus rotated beyond 90 degrees until the right rear struck the left side of the locomotive, causing three fatal injuries. The bus then rolled upright and on its wheel 300 feet coming to rest when it collided with a wooden garage. No ejections occurred. All three fatalities and many of the more severe injuries resulted from the secondary impact of the right rear bus against the left side of the train.

Flamboe, EE Ouelett, J  
 University of Southern California, National Highway Traffic Safety Administration Tech Rpt. DOT-HS-803-237, Feb. 1977, 142 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-277542/7ST, DOTL NTIS

#### 12 175673

### RAILROAD/HIGHWAY ACCIDENT REPORT-COLLISION OF A CHICAGO, ROCK ISLAND AND PACIFIC RAILROAD COMPANY FREIGHT TRAIN WITH AN AUTOMOBILE, DES MOINES, IOWA, JULY 1, 1976

On July 1, 1976, near Des Moines, Iowa, a westbound Chicago, Rock Island and Pacific Railroad Company freight train struck an automobile that had slowed but did not stop for the flashing signal lights at a grade crossing. All five persons in the automobile were killed. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the automobile driver to stop short of the railroad track in response to the flashing signal lights and her failure to determine if it was safe to cross the track.

National Transportation Safety Board NTSB-RHR-77-2, Nov. 1977, 22 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-277041/OST, DOTL NTIS

#### 12 175674

### RAILROAD/HIGHWAY ACCIDENT REPORT-COLLISION OF A BURLINGTON NORTHERN FREIGHT TRAIN WITH A BUS, STRATTON, NEBRASKA, AUGUST 8, 1976

On August 8, 1976, an eastbound Burlington Northern freight train struck a southbound bus at a grade crossing in Stratton, Nebraska. The bus was en route to a local church where the passengers were to attend Sunday school. Of the 17 persons in the bus, 9 were killed and 8 were injured. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the bus driver to perceive the approaching train and to stop his vehicle short of the tracks. Contributing to the accident was the inadequacy of the grade crossing's obsolete wigwag warning signal as a warning device, the visual obstruction of the signal and partial obstruction of the train by parts of the bus, and the inadequacy of the train's horn as a reliable warning system.

National Transportation Safety Board NTSB-RHR-77-1, Aug. 1977, 15 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-277042/8ST, DOTL NTIS

#### 12 175793

### RAILROAD ACCIDENT REPORT. HEAD-ON COLLISION OF TWO GREATER CLEVELAND REGIONAL TRANSIT AUTHORITY TRAINS, CLEVELAND, OHIO, JULY 8, 1977

About 10:05 a.m., E.D.T., on July 8, 1977, two trains of the Greater Cleveland Regional Transit Authority collided head-on on the eastbound track of the Shaker Heights Line, near 92nd and Holton Streets in Cleveland, Ohio. Sixty persons were injured and property damage was estimated to be \$100,000. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Greater Cleveland Regional Transit Authority to have established rules and procedures, and special instructions to assure safe train operations. Contributing to this accident were the failure of both supervisors to establish and coordinate adequate local procedures for operating trains in both directions on a single track, and, further, the vegetation along the curve which was allowed to grow to the extent that the view was blocked.

National Transportation Safety Board NTSB-RAR-78-2, Feb. 1978, 23 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-278191/2ST, DOTL NTIS

#### 12 175808

### RAILROAD ACCIDENT REPORT-REAR END COLLISION OF TWO CONRAIL FREIGHT TRAINS, STEMMERS RUN, BALTIMORE, MARYLAND, JUNE 12, 1977

About 11:03 p.m., on June 12, 1977, ConRail freight train WA-4 collided with the rear of ConRail freight train WA-6. A fire began in the lead locomotive unit of train WA-4 and in the caboose of train WA-6. Damage was about \$300,000. Two crewmembers on each train were injured. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer of train WA-4 to fulfill his responsibility to properly control the speed of the train, as required by the signal indications, to insure that it could be stopped before passing signal 880. Contributing to the severity of the accident was the manner in which the engineer of train WA-4 applied and released the brakes approaching the accident point and the failure of the engineer of train WA-6 to communicate with the tower and train WA-4 when train WA-6 stopped.

National Transportation Safety Board NTSB-RAR-78-1, Jan. 1978, 24 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-277990/8ST, DOTL NTIS

#### 12 175810

### RAILROAD ACCIDENT REPORT. REAR END COLLISION OF TWO CHICAGO TRANSIT AUTHORITY TRAINS, CHICAGO, ILLINOIS, FEBRUARY 4, 1977

About 5:27 p.m., C.S.T., on February 4, 1977, Chicago Transit Authority Lake-Dan Ryan train No. 930 struck the rear of Ravenswood train No. 415, which was standing on the elevated rail structure at the intersection of Wabash Avenue and Lake Street. The four lead cars of the eight-car Lake-Dan Ryan train overturned and fell from the elevated structure to the street. One end of each of the two rear cars of the Ravenswood train derailed. Eleven persons were killed and 266 persons were injured. Property damage was estimated to be \$1.2 million. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the motorman to exercise due care in meeting his responsibilities and the unauthorized operation of the Lake-Dan Ryan train into a signal block occupied by the standing Ravenswood train, at a speed that was too fast to stop after the operator sighted the standing train.

National Transportation Safety Board NTSB-RAR-77-10, Nov. 1977, 38 pp

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-277961/9ST, DOTL NTIS

#### 12 175811

### RAILROAD/HIGHWAY ACCIDENT REPORT. COLLISION OF AN AMTRAK/ATCHISON, TOPEKA AND SANTA FE RAILWAY TRAIN AND A TRACTOR-CARGO TANK SEMITRAILER, MARLAND, OKLAHOMA, DECEMBER 15, 1976

About 8:58 a.m., C.S.T., on December 15, 1976, Amtrak passenger train No. 15, operating on the Atchison, Topeka and Santa Fe Railway, collided with

an oil-laden tractor-semitrailer (tank) at the Kay-Noble County Line Road grade crossing near Marland, Oklahoma. The truck driver & 2 train crewmembers were killed; 11 other persons on the train were injured. The truck and its lading were destroyed. Two locomotive units and two cars of the train were damaged. Total accident damage was estimated to be \$880,700. The National Transportation Safety Board determines that the probable cause of this accident was the lack of adequate warning of the approach of a high-speed train to enable the truck driver to ascertain when it was safe to enter the crossing. Contributing to the accident was the crossing's unsuitability for joint use by high-speed trains and heavily loaded trucks.

National Transportation Safety Board NTSB-RHR-77-3, 1977, 28 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277960/1ST, DOTL NTIS

#### 12 175993

#### TRANSPORTATION SAFETY INFORMATION REPORT. OCTOBER, NOVEMBER, AND DECEMBER 1977 AND ANNUAL SUMMARY

The publication is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report are discussions on Railroad Tank Car Safety and Roadside Truck Inspections.

See also NTISUB/C/224-003 Paper copy also available on subscription, North American Continent price \$30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-P24-77-4, Mar. 1978, 120 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTISUB/C/224-004

#### 12 176068

#### HEAT-ACTIVATED ALARM SYSTEM FOR RAILROAD BOXCARS CARRYING EXPLOSIVES

An alarm system concept designed to alert train operators of excessive heating of any of the wheels of a boxcar laden with high-explosives has been developed. The excessive heat was determined to be caused by friction between a wheel and brake shoe that does not properly release while the train is in motion. The alarm system consists of heat sensors that are located on the boxcar above each wheel. These are wired to an alarm transmitter mounted near the top of the boxcar. This concept requires that each boxcar laden with high explosives be outfitted with the sensors and a transmitter. A receiving system is then located in the train caboose to decode the alarm signals, identify the boxcar, and sound the alarm. The system hardware, tests, and evaluation are described. (Author)

Brooks, JL

Naval Construction Battalion Center, (F53534) CEL-TN-1512, Dec. 1977, 27 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A051868/8ST

#### 12 176687

#### REGULATIONS FOR THE TRANSPORT OF DANGEROUS MATERIAL APPLICABLE TO ALL CARRIERS

[Gefahrstoffverordnung fuer alle Verkehrstraeger]

No Abstract. [German]

See also Volume 10, pp 9-11.

Bode, RJ *Gefahrliche Ladung/Dangerous Cargo* Vol. 22 No. 9, 1977, pp 13-19, Tabs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Storck (KO) und Co-Verlag und Druckerei GmbH, Stahlwerke 7, 2000 Hamburg 50, West Germany

#### 12 176904

#### LAWS, RULES, AND INSTRUCTION FOR INSPECTION AND TESTING OF LOCOMOTIVES OTHER THAN STEAM

No Abstract.

Federal Railroad Administration 1977, 124 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

#### 12 177031

#### SAFETY STOPS AT TERMINALS EVALUATED

London seminar considered friction buffer-stops and sand-drags as a means for preventing trains for over-running dead-end tracks in stations and yards.

*Railway Engineer* Vol. 3 No. 1, Jan. 1978, pp 34-38, 4 Fig.

ORDER FROM: ESL

DOTL JC

#### 12 177177

#### DESIGN OF A METAL SKINNING ENERGY ABSORBER FOR THE U.S. CAPITOL SUBWAY SYSTEM

The design of a metal skinning emergency overshoot stopping device for the U. S. Capitol Subway System is discussed. The kinetic energy of the vehicle is dissipated by pulling a round rod through a circular cutting tool. The design procedure used in the selection of critical components is reviewed and a systematic method for their selection is shown. Photographs of the final design hardware are shown. A subway collision test was conducted and the results of the test are shown to agree well with predictions.

Kirk, JA (Maryland University, College Park) *International Journal of Mechanical Sciences* Vol. 19 No. 10, 1977, pp 595-602, 7 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

#### 12 178140

#### HOW SYSTEM SAFETY WORKS IN THE NEW YORK CITY TRANSIT AUTHORITY

No Abstract.

DeVito, JP *Traffic Safety* Vol. 78 No. 2, Feb. 1978, 3 pp

ORDER FROM: National Safety Council, 444 North Michigan Avenue, Chicago, Illinois, 60611

#### 12 178422

#### AN EVALUATION OF RAILROAD SAFETY

The Federal Railroad Safety Authorization Act of 1976 required an evaluation of the effectiveness of Federal efforts to improve the safety of U.S. railroads. This report provides a comprehensive and systematic review of safety to assist in current and future legislative deliberations on railroad safety. It includes an examination of current accident and cost trends; and evaluation of safety laws, regulations and inspection programs; and an overview of current research, development and voluntary safety programs. Also included is a discussion of the relation of safety and economics in the railroad industry.

United States Congress 1978, 224 pp, Figs., 49 Tab., Photos., 5 App.

ACKNOWLEDGMENT: United States Congress

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DOTL RP

#### 12 178448

#### PROTECTION OF TRAINS ENTERING TERMINALS

London Transport undertakes extensive controlled tests to demonstrate the effectiveness of sand drags at terminals; addition of an intermediate rail-mounted skid ensures no derailment. LT also introduces speed-control safeguards to further ensure maximum safety.

Hillel, H *Railway Engineer* Vol. 3 No. 2, Mar. 1978, pp 40-43, 10 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

12 178528

**ESTIMATE OF THE FIRE-PROOF QUALITY OF COACHES: ONE OF THE SAFETY AND QUALITY CONTROLS BY VEB WAGGONBAU, GORLITZ**

The quality control of vehicles includes all characters determining, or influencing essentially, the safety of passengers, staff, plants and vehicles, and in particular their fire-proof quality. This is included in documents considering their highest possible safety in accordance with the present state of knowledge, such as in the "Instruction concerning the Estimate of the Quality of Coaches" elaborated by VEB Waggonbau Gorlitz with a view to considering extensively technical problems of fire protection. Moreover, a wide and thorough control by the quality inspection commission will assure a high protection of vehicles against fire. [German]

Bewersdorf, P Lehe, P *DET Eisenbahntechnik* Vol. 26 No. 2, Feb. 1978, pp 75-78

ACKNOWLEDGMENT: British Railways

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

12 178550

**TANK-CAR RETROFIT: WHAT? HOW MANY? WHEN?**

Over 20,000 of the U.S.-owned ICC Class 112 and 114 tank cars are being retrofitted with various combinations of head shields, shelf couplers, insulation and jacketing to increase their safety during accidents when they are transporting ladings such as anhydrous ammonia, vinyl chloride monomer, liquefied petroleum gas and other hazardous and/or non-flammable materials. Despite early optimistic statements about time and costs by National Transportation Safety Board, DOT and car owners see a much more protracted and expensive program.

Welty, G *Railway Age* Vol. 179 No. 12, June 1978, pp 31-33, 10 Phot.

ORDER FROM: ESL

DOTL JC

12 178551

**DOW AND THE RAILROADS: PARTNERS IN SAFETY**

Railroads serve 50 U.S. plants of Dow Chemical which manages a fleet of 7,000 owned and leased cars. Maintenance, operation and safety of this fleet involved in chemical traffic are major corporate concerns. Safety dominates every aspect of the company's rail involvement, even to rates and routes.

Malone, F *Railway Age* Vol. 179 No. 12, June 1978, pp 26-29, 2 Phot.

ORDER FROM: ESL

DOTL JC

12 178913

**COMMUTER RAILROAD SAFETY ACTIVITIES ON CONRAIL'S LINES IN NEW YORK SHOULD BE IMPROVED**

Inadequacies in safety activities on Conrail commuter lines in Metropolitan New York need to be corrected, it was found. Conrail was not making most required safety inspections and its records did not show corrective action taken on deficiencies which were noted. Conrail records did not contain sufficient information to permit an assessment of the overall safety of Conrail's commuter operations. While Federal Railroad Administration is responsible for establishing railroad safety standards and assuring that carriers comply with them, it has been ineffective in its regulatory role because it has not adequately monitored Conrail safety activities.

Report to the Subcommittee on Transportation and Commerce, House Committee on Interstate and Foreign Commerce.

General Accounting Office CED-78-80, Mar. 1978, 39 pp, Photos., 5 App.

ACKNOWLEDGMENT: General Accounting Office, NTIS

ORDER FROM: General Accounting Office, Distribution Section, Room 4522, 441 G Street, NW, Washington, D.C., 20548 NTIS

PB-278506/1ST, DOTL RP

12 179261

**DEVILISH DEEDS FOR NUCLEAR SAFETY**

Accident was staged as one of a series of tests conducted for the Energy Research and Development Administration (now part of the Dept. of Energy) by Sandia Laboratories in Albuquerque. The object was to prove that the hardware used to transport nuclear materials will stand up to the most devilish accidents conjurable by man.

*Fortune* Vol. 97 No. 11, June 1978, pp 148-149, 3 Phot.

ACKNOWLEDGMENT: Fortune

ORDER FROM: Time Incorporated, 540 North Michigan Avenue, Chicago, Illinois

DOTL JC

12 179520

**THE PRICE OF SAFETY-DEVELOPMENT OF RAILWAY SAFETY**

The author shows how railway safety has developed, usually in response to public opinion, to the high standard of today. He traces the significant improvements in safety that have been achieved during the past 15 years and discusses the extent to which further improvements might be justified. The lecture also raises the possibility that, for certain lines, some relaxation of the current safety requirements, with consequent cost savings, might be made without a significant lowering of safety standards.

McNaughton, IKA *Institution of Mechanical Engineers Proceedings* Vol. 191 No. 1/77, 1977, pp 1-9, 10 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 232520)

ORDER FROM: ESL

DOTL JC

13 053261

## HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEED. SHORT-CIRCUIT CURRENT LOAD CAPACITY OF OVERHEAD LINE SYSTEM WIRES AND CABLES

This report analyses the thermal behaviour of the components of an overhead line in short-circuit conditions. Information is given about the temperatures produced in copper and copper alloy contact wires and bronze catenary cables by the short-circuit currents generated. Maximum permissible currents for contact wires, bronze cables, droppers and copper wires.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways A129/RP 7, Apr. 1977, 17 pp, 10 Phot.

ACKNOWLEDGMENT: UIC

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DOTL RP

13 053262

## HIGH-SPEED TESTING OF CATENARIES AND PANTOGRAPHS IN ALSACE IN NOVEMBER 1975

No Abstract.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways DT 60, Aug. 1977, 19 pp, 3 Phot., 16 App.

ACKNOWLEDGMENT: UIC

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DOTL RP

13 053263

## FEASIBILITY STUDY OF THE ELECTRONIC ARC AS A MEANS OF POWER COLLECTION AT HIGH-SPEEDS, UP TO 500 KM/H

No Abstract.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways DT 67, Feb. 1977, 43 pp, 43 Phot.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

13 053267

## HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEEDS, PERMISSIBLE CURRENT LOADING AT THE CONTACT POINT BETWEEN CONTACT WIRE AND CURRENT COLLECTOR AT REST AND DURING STARTING

The report describes a study of the influence of various parameters on the active current transfer surface between contact wire and current collector as well as of localised heating and physical structural changes of this surface. The permissible limits of current transfer in dependence of the contact force are given.

Restrictions on the use of this document are contained in the explanatory materials.

International Union of Railways A 129/RP 8, Apr. 1977, 33 pp, 22 Fig., 10 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

13 172022

## WALTAR-KIRANDUL ELECTRIFICATION RUNS INTO TECHNICAL PROBLEMS

When electrification of the 440-km line, built in the 1960s to tap iron ore deposits, was approved in 1970, it seemed a logical decision. A descent of 1,000 m on a 1.7 percent ruling grade seemed to justify regenerative braking and the projected annual traffic was five times the theoretical breakeven point at which electrification becomes viable. The author explains why electrification has been delayed and discusses technical problems that have yet to be solved. Currents in overhead lines may cause greater induced voltages in communications cables than was earlier thought; power supplies are costly in this remote area and regeneration has had to be abandoned because of a lack of suitable a-c electric locomotives.

Mukherjee, PK *Railway Gazette International* Vol. 134 No. 1, Jan. 1978, pp 30-33, 3 Fig., 2 Phot.

ACKNOWLEDGMENT: Railway Gazette International  
ORDER FROM: ESL

DOTL JC

13 172666

## ATTENUATION OF PANTOGRAPH OSCILLATION [Zastosowanie tłumienia w odbieraku prądu]

No Abstract. [Polish]

Grajnert, J *Pojazdy Szynowe* No. 2, 1977, pp 16-21, 3 Tab., 10 Phot., 16 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Pojazdy Szynowe, Warsaw, Poland

13 172934

## THE ELECTRIFICATION THAT MIGHT HAVE BEEN--AND MIGHT STILL BE

The Railroad Revitalization and Regulatory Reform Act has a provision which provides \$200 in loan guarantees for Conrail electrification if it can be justified. This has set off a study of the 250-mile route between Enola, Pa., and Pittsburgh, the former Pennsylvania Railroad mainline across the state. PRR had made a series of studies of this same project from the early years of the century. This article describes these studies made in 1908, 1913, 1923, 1930 and 1955. For a variety of reasons none of those plans were ever implemented.

Bezilla, M *Trains* Vol. 38 No. 5, Mar. 1978, pp 30-34, 4 Phot.

ACKNOWLEDGMENT: Trains

ORDER FROM: Kalmbach Publishing Company, 1027 North Seventh Street, Milwaukee, Wisconsin, 53233

DOTL JC

13 172935

## CONRAIL STUDIES THE PROS (AND THE CONS) OF MORE ELECTRIFICATION

A feasibility study of its route with the heaviest traffic has been undertaken by Consolidated Rail Corp. to determine if a provision of the Railroad Revitalization and Regulatory Reform Act which allows Conrail loan guarantees of up to \$200 million for electrification could be utilized for the Harrisburg/Pittsburgh line and for an alternate to the Northeast Corridor between Philadelphia and New York. To show if there is justification, Conrail and its contractor are projecting future traffic levels and costs of electric power and diesel fuel, developing operating strategies for electrified operation, designing catenary and electric power supplies, appraising the effect of electrification on signals and communications, and determining the financial implications of electrification.

DeGennaro, RE (Consolidated Rail Corporation) *Railway Age* Vol. 179 No. 3, Feb. 1978, pp 24-25

ORDER FROM: ESL

DOTL JC

13 173146

## DEVELOPMENTS IN RAIL TRANSPORT ENERGY SYSTEMS AND ELECTRIFICATION [Razvitie energetiki i elektrifikacii zheleznodorozhnogo transporta]

This article gives a brief review of the use of electricity on the SZD since the beginning of this century. Data is given in tables to show the increase in the number of sub-stations, in electricity consumption on the SZD, in the length of overhead lines and in the transformer stations. In addition the author describes the various stages in the introduction of electric traction up to the present day and forecasts development up to 1980. [Russian]

Serdinov, SM *Zheleznodorozhnyi Transport* No. 11, 1977, pp 25-31, 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novc-Basmanaya Ulitsa 2, Moscow B-174, USSR

13 173158

## FAULT LOCATION SYSTEM IN AUTOTRANSFORMER FEEDING CIRCUIT OF AC ELECTRIC RAILWAYS

The distance vs. reactance curve of the autotransformer feeding circuit as used for the Sanyo line is not linear but approximately parabolic. Further, it differs from circuit to circuit. For this reason, conventional fault locators can not be used for the autotransformer feeding circuit. An attempt was

made to measure the distance between the feeding point and the fault point by combining feeding voltages with feeder currents in a suitable way. It was found that the neutral current ratio of the autotransformer is proportional to the distance. The neutral current ratio type fault locator has been developed on the basis of this principle. This system was applied to the Okayama-Hakata section (393 km) of the Sanyo line for the first time and since then, has continually worked very satisfactorily. This paper describes the impedance and neutral current ratio characteristics of the autotransformer feeding circuit and outlines the neutral current ratio type fault locator and its operating records.

Fujie, H (Railway Technical Research Institute, Japan); Miura, A  
*Electrical Engineering in Japan* Vol. 96 No. 5, Sept. 1976, pp 96-105, 19 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

### 13 173378

#### APPLICATION OF ELEMENTARY QUEUEING THEORY ON THE SUPPLY OF ELECTRIC POWER ON THE LINE OSLO-LILLESTROM [En anvendelse av elementaer ko-teori pa stromforsyningen Oslo-Lillestrom]

Queueing theory is a well known tool for capacity calculations for railways. Most applications are however concerned with train movements on the line, or terminal design. This article indicates the possibilities within another area of the railway system. It analyzes the probability of overload in the electric power supply when using BM 69 thyristor-controlled commuter trains. These trains are characterized by a large demand for current at short intervals of acceleration, and the problem dealt with is how to calculate the probabilities of simultaneous acceleration of trains within a given period of time. [Norwegian]

Gronland, SE *NSB-Teknikk* Vol. 3 No. 2, 1977, pp 39-42

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Norwegian State Railways, Storgaten 33, Oslo 1, Norway

### 13 173380

#### RUNNING BR WEST COAST ROUTE ON 25 KV

Review of paper presented to the Institution of Mechanical Engineers in which the author mentions remedies taken such as overcoming overhead 'blow-offs', broken rails, wheel shelling, and locomotives' adhesion performance; also the trial application of thyristor control.

Ribbons, RT *Railway Engineer* Vol. 2 No. 6, Nov. 1977, pp 42-44, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

### 13 173422

#### THEORY OF Y-SUSPENSION AND OPTIMUM CATENARIES FOR ELECTRIFIED LINES [Theorie des Y-Beiseiles und optimale Fahrleitungen elektrischer Bahnen]

This study, based on a considerable amount of literature, discusses the mathematical possibilities which would enable judgment to be formed on the design and quality of a suspension system with a contact wire below the static angle, a system which includes Y-suspensions. The study is a first step towards establishing the elastic constant of the catenary in order to obtain optimum behaviour during train-running. [German]

Gerichten, F *Archiv fuer Eisenbahntechnik* No. 32, 1977, pp 69-77, 18 Phot., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

### 13 173428

#### PROBLEMS ARISING IN CONTACT LINE NETWORKS IN CONNECTION WITH PHASE REGULATION OF THYRISTOR LOCOMOTIVES [Problemes dans les reseaux de lignes de contact en relation avec le reglage de phase des locomotives a thyristors]

Phase regulation of thyristor locomotives causes harmonics in the single-phase power supply network, which may lead to undesirable overvoltage. The author explains the causes of this phenomenon and offers suggestions for combatting it. [French]

Graf, R *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 745-750, 6 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

### 13 173433

#### STUDY OF A COMPENSATION RECTIFIER UNIT BASED ON A THREE-PHASE BRIDGE ASSEMBLY [Issledovaniya Kompensirovannogo vyprjamitel'nogo agregata po trehfaznoj mostovoj sheme]

No Abstract. [Russian]

Nikolaev, GA Sokolov, NA *Vestnik VNIIZT* No. 7, 1977, pp 20-23, 4 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

### 13 173594

#### A STUDY OF PANTOGRAPH FOR HIGH SPEED RUNNING

Variation of pantograph contact force, wavelike wear of the contact wire and loss of contact at high speed are investigated; the three factors of current collection are found to be closely related. In explaining the loss of contact on the Shinkansen, several causes have been observed. Digital simulation of pantograph parameters and contact force variations led to development of a modified pantograph with a new sliding element which is expected to reduce the loss of contact with the wire.

Shimomae, T Aihara, M *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 4, Rpt No. 1017-76, Dec. 1977, pp 164-167, 12 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

### 13 173788

#### ENERGY SAVINGS BY REGENERATION ON A PROPOSED ELECTRIFIED RAILROAD BETWEEN HARRISBURG AND PITTSBURGH

Electrification of the railroads in the United States is a viable strategy for conserving oil and improving the efficiency of moving both freight and passengers. One of the prime candidate routes for electrification is the main line of Conrail between Harrisburg and Pittsburgh. Because of the large tonnage and steep grades which occur on this route, it is also a prime candidate for further energy savings by use of regeneration of electrical power. This paper considers the feasibility of using regeneration on the proposed electrification of the main line of Conrail between Harrisburg and Pittsburgh. Locomotives equipped for regeneration convert the braking energy, when operating with trains on down grades, to electrical energy for use by other locomotives hauling trains on the electrified railroad. Energy consumption and energy costs are estimated with and without regeneration. Several distribution system configurations are considered and the sensitivity of regeneration savings to substation spacing, type of distribution system and power contract is investigated. Based upon hauling traffic of 56.8 million gross trailing tons per year in each direction between Harrisburg and Pittsburgh, and at present energy costs, it is estimated that 58,000 MWH of energy and \$1.8 million in energy cost can be saved. This represents a 9% energy and a 7% energy cost savings. It is estimated that the cost of a locomotive equipped for regeneration may be about 10% higher than a non-regenerative locomotive; thus, based on a fleet size of 100 6000HP locomotives required for service at \$1.1 million each an additional capital expenditure of \$11 million would be required.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference, April 11-13, 1978, St. Paul, Minnesota.

Uher, RA Pastoret, JE (Carnegie-Mellon University)  
Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8 IA, 1978, pp 31-40, 16 Fig., 1 Tab., 7 Ref.

ACKNOWLEDGMENT: IEEE  
ORDER FROM: ESL

DOTL RP

### 13 173793

#### THE TECHNICAL FEASIBILITY OF RAILROAD ELECTRIFICATION WITH HIGH VOLTAGE (10-50 KV) DIRECT CURRENT

High-voltage (10-50 kV), direct-current power distribution may prove to be an economically and technically attractive option for railroad electrification

of the future. There may be potential economic advantages in both wayside installation and operation, and in the propulsion equipment aboard the rolling stock. However, before an economic comparison with AC systems can be completed, the technical feasibility of DC systems must be determined, which is the purpose of this paper. This paper is directed toward the wayside equipment only. The problem of HVDC rolling stock is not considered. This analysis shows no technical obstacle to the use of HVDC power distribution systems for application to the wayside portion of railroad electrification. Circuit breakers, which can be applied to these systems, are in various stages of development, and with reasonably directed research can meet the duty requirements. Likewise, rectifiers which can satisfy both current and voltage requirements are within the state of the art. An alternate to using the DC breaker, namely, sectionalizing on the AC side of the system, is a viable option. This option may sacrifice some operational flexibility as well as performance.

Presented at the 1978 Joint ASME/IEEE/AAR Railroad Conference, April 11-13, 1978, St. Paul, Minnesota.

Uher, RA (Carnegie-Mellon University)  
Institute of Electrical and Electronics Engineers Tech Pap. 78CH1345-8  
IA, 1978, pp 1-13, 15 Fig., 4 Tab., 29 Ref.

ACKNOWLEDGMENT: IEEE

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## 13 173799

### NEW OVERHEAD CONTACT SYSTEM DROPPER CONNECTOR FOR RAILWAY LINE ELECTRIFICATION [Nueva grifa de pendola de hilo de contacto para electrificaciones de ferrocarril]

The part by which the hanger grips of the power cable of an electrified line is known as a hanging clamp. This part is the most numerous of all in railway electrification installations. They may have two forms. They either maintain the hanger in a rigid position or else they allow it to move. The main problem is to try to ensure that the clamps are made of the smallest possible number of pieces, for various reasons—simplicity, ease of manufacture, and lower costs. They should not have threaded elements which are disadvantageous; they should be of low volume to use less raw material and it should be possible to use only one type for all the kinds of hangers in use, in order to achieve standardisation and simplicity. This clamp, compared with 16 others used in various national and foreign lines, has all the above-mentioned characteristics, as it is all in one piece and does not require any safety securing elements. It serves equally well for a lateral hanger where the two wings are placed in the grooves of the power cable. Its weight of 28 grams makes it the lightest of all those known and studied. Its installation will not be immediate but it must be ready and tested for when substantial new electrifications are under discussion. [Spanish]

Perez Morales, G *AIT-Revista* No. 18, Oct. 1977, pp 49-53

ACKNOWLEDGMENT: British Railways

ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

## 13 173801

### IMPACT OF RESEARCH AND DEVELOPMENT ON RAILROAD ELECTRIFICATION

While no technological break-throughs would seem to make obsolete current electrification technology, certain research and development projects which could be implemented in the next decade could result in significant savings in both capital and operating costs. Among the areas discussed are the utility interface, catenary design, locomotive technology and potential payoff for such investigations.

See also 13 170110, RRIS Bulletin 7801.

Raposa, FL (Transportation Systems Center) *Transportation Research Board Special Report* 1977, pp 54-60, 2 Tab., 4 Ref.

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## 13 173802

### INTERFERENCE OF ELECTRIFICATION WITH SIGNALING AND COMMUNICATION SYSTEMS

The problems with electromagnetic and electrostatic induction and other complications of railway electrification are discussed. Track circuits must be immune to traction currents and methods of accomplishing this are explained. Per-kilometer costs of converting a double track railroad for electrification are given.

See also 13 170110, RRIS Bulletin 7801.

Kendall, HC (General Railway Signal Company) *Transportation Research Board Special Report* 1977, pp 47-54, 12 Fig.

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## 13 173803

### CAPITAL AND MAINTENANCE COSTS FOR FIXED RAILROAD ELECTRIFICATION FACILITIES

This paper discusses fixed-facility costs, including those for catenary, substations and interconnections to utilities. It also considers the effects on existing signal systems of electrification. Estimated costs are developed.

See also 13 170110, RRIS Bulletin 7801.

Schwarm, EG (Little (Arthur D), Incorporated) *Transportation Research Board Special Report* 1977, pp 42-47, 4 Fig., 5 Ref.

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## 13 173804

### MAINTENANCE OF DIESEL AND ELECTRIC MOTIVE POWER

The costs, results and problems of electric locomotives operating in the United Kingdom are compared with diesel-electric locomotives operating under similar conditions. Both operating and maintenance costs are discussed.

See also 13 170110, RRIS Bulletin 7801.

Calder, GSW (Brush Electrical Machines Limited, England) *Transportation Research Board Special Report* 1977, pp 39-42, 3 Tab.

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## 13 173805

### MAINTENANCE AND CAPITAL COSTS OF LOCOMOTIVES

Maintenance costs of electric and diesel-electric locomotives will vary considerably depending on the service. Maintenance costs of electrics will be 30 to 60% of comparable diesel electrics. Life expectancy is similar at 25 years with both types subject to technology obsolescence. First costs will not be greatly different.

See also 13 170110, RRIS Bulletin 7801.

Ephraim, M, Jr (General Motors Corporation) *Transportation Research Board Special Report* 1977, pp 38-39, 1 Fig.

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DOTL RP

## 13 173806

### TECHNOLOGICAL ISSUES. LOCOMOTIVE COSTS: A RAILROAD ELECTRIFICATION ISSUE

From worldwide experience it appears that a fleet of electric locomotives will cost about 90% of the equivalent diesel-electric ownership, that the economic life will be twice as long and that electric locomotive maintenance is about one third that of diesel-electrics.

See also 13 170110, RRIS Bulletin 7801.

Meeker, MD, Jr (General Electric Company) *Transportation Research Board Special Report* 1977, pp 35-37, 1 Tab., 7 Ref.

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DOTL RP

## 13 173807

### CANADIAN RAILWAY ELECTRIFICATION STUDY: PHASE 1

This is a summary of a 764-page report by the Canadian Institute of Guided Ground Transport of a study financed by Canada's Department of Transport. It is concluded that benefits of electrification would accrue not solely to railways, reducing reliance on imported oil, enhancing employment opportunities and having other effects on Canada's domestic economy. It is proposed that 9500 miles of lines carrying more than 400 million gross tons annually be electrified over 30 years. An initial prototype operation would be implemented on an existing mainline.

See also 13 170110, RRIS Bulletin 7801.

Cornell, ER (Canadian Institute of Guided Ground Transport) *Transportation Research Board Special Report* 1977, pp 27-34, 6 Fig., 1 Tab., 1 Ref.

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13 173808

**UTILITY SERVICE TO ELECTRIFIED RAILROADS**

When limitations with respect to voltage unbalance and single-phase loading are observed, a railroad's single-phase load can be served without harmful effects to a utility system's generating or distribution equipment. Supply of power to mobile loads of an individual railroad at several different locations, in most cases by several utility companies, poses problems concerning rates, regulatory tariffs and legal obligations not previously encountered by American utilities. Railroads, utilities and government will have to face issues that include changes in operating techniques and new concepts of rate structures and contractual arrangements.

See also 13 170110, RRIS Bulletin 7801.

Ross, BA (American Electric Power Service Corporation) *Transportation Research Board Special Report* 1977, pp 24-27, 1 Ref.

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DOTL RP

13 173809

**FINANCIAL CONSIDERATIONS OF RAILROAD ELECTRIFICATION**

Electrification of 10,000 route miles in the U.S. having traffic density of 40 million gross tons per year is estimated to cost \$2 billion, the largest investment in roadway and structures that railroads would make since original construction of the lines. With certain exceptions, it would be difficult for railroads to finance such projects from their own resources. With proper return on investment, four options are proposed: Sale of mortgage bonds, common stock equity, leasing, and project financing. In any case, government participation will be required.

See also 13 170110, RRIS Bulletin 7801.

Fishbein, R (Loeb (Kuhn) and Company, Incorporated) *Transportation Research Board Special Report* 1977, pp 16-19, 2 Ref.

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13 173810

**INSTITUTIONAL AND ECONOMIC ISSUES, ELECTRIFICATION AND RAILROAD ORGANIZATION AND OPERATIONS**

While predicting electrification of mainline railroads in the western states, the author assesses the causes of the present wait-and-see attitude as uncertainty over federal energy policy, the high initial capital investment in facilities and locomotives, the restricted service applications, and the necessity of a high volume of traffic. Advantages which could accrue from such a step are also summarized.

See also 13 170110, RRIS Bulletin 7801.

Craven, ER (Burlington Northern, Incorporated) *Transportation Research Board Special Report* 1977, pp 13-16

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DOTL RP

13 173811

**AMTRAK'S VIEW OF RAILROAD ELECTRIFICATION**

Predicting that there will be an expansion of electrification beyond that which will be part of the Northeast Corridor Improvement Project, the author sees finance as the major barrier. Some of the problems of Corridor operation with the proposed new system are discussed, as well as some of the advantages of locomotive-hauled and multiple-unit trains.

See also 13 170110, RRIS Bulletin 7801.

Reistrup, PH (National Railroad Passenger Corporation) *Transportation Research Board Special Report* 1977, pp 8-9

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DOTL RP

13 173812

**GENERAL ISSUES, THE ADVANTAGE OF ELECTRIFYING THE NATIONS RAILROADS**

A national commitment to electrification of U.S. railroads is advocated. Such a step would increase the competitiveness and profitability of the systems, save liquid fuels for other purposes, and increase employment within and without the railroad industry. Several examples of specific services being enhanced by electrification are cited.

See also 13 170110, RRIS Bulletin 7801.

Shapp, MJ *Transportation Research Board Special Report* 1977, pp 5-8

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13 174028

**LOCALIZATION OF THE MAIN RADIO INTERFERENCE SOURCES IN ELECTRIC TRACTION VEHICLES [Lokalizacja głównych źródeł zakłóceń radioelektrycznych w elektrycznych pojazdach trakcyjnych]**

The results of investigation into the localization of main interference sources in dc traction vehicles are given. It has been found by measurements, that the main interference source is the contact point of the current collector with the contact system. [Polish]

Laskowski, M *Przegląd Elektrotechniczny* Vol. 53 No. 5, May 1977, pp 197-201, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

13 174029

**KERZERS CONVERTER PLANT OF THE SWISS FEDERAL RAILROAD SYSTEM [Das Umformerwerk Kerzers der Schweizerischen Bundesbahnen]**

Since 1963 the Swiss Federal Railroads (SBB) upgraded a number of converter stations. The one in Kerzers was completed in 1976. The concept and arrangement of this modern plant are described. Reference is made to earlier plants, as well as to the converter station at Seebach which is under construction. [German]

Ingold, R *Elektrische Bahnen* Vol. 48 No. 5, May 1977, pp 110-118, 6 Ref.

ACKNOWLEDGMENT: EI

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13 174037

**MODERN CONSTRUCTION OF OVERHEAD CONTACT SYSTEM [Moderner Fahrleitungsbau]**

A modern overhead line construction is characterized by automated production methods, extensive use of operational equipment and intensive planning of working procedures. Thereby it has been possible to diminish considerably waste production hours for new construction and maintenance work. A description is given of the working procedures during the new construction of an overhead line and of the vehicles, machines and tools used. [German]

Bauermeister, K *Elektrische Bahnen* Vol. 48 No. 5, May 1977, pp 119-122

ACKNOWLEDGMENT: EI

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13 174389

**CONTROL SYSTEM UNDER THE CONTACT WIRE OF ELECTRIC RAILROADS [Asservissement d'un dispositif au fil de contact équipant les voies ferroviaires électrifiées]**

An optoelectronic system controlling a carriage under one of the contact wires of the overhead traction lines is described. The carriage, intended to receive a wear measurement or possibly, a maintenance system, is driven under the contact wire with an accuracy of 3 mm at a traveling speed of 50 km/h. Results obtained during a number of tests on line under 1500 and 25,000 V, are given. [French]

Mathieu, H (Languedoc University of Science and Tech, France);

Dandonneau, JM Rouan, G *Revue Generale de l'Electricite* Vol. 86 No. 10, Oct. 1977, pp 765-771

ACKNOWLEDGMENT: EI

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13 176712

**THE ELECTRIC POWER INSTALLATIONS IN MASCHEN MARSHALLING YARD [Die elektrischen Energieanlagen des Rangierbahnhofs Maschen]**

Description of the electric power installations in the new marshalling yard at Maschen: power for tractive current in the overhead lines, electricity for lighting the sets of sidings, heating the points and supplying the remote control installations. [German]

Gladigau, R Mielke, D *Elektrische Bahnen* No. 12, 1977, pp 301-308, 13 Phot.



ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

13 177032

## OVERHEAD SYSTEM DESIGN BY COMPUTER

Standardized design procedures for catenary and support systems allow introduction of computerized methods for layout, drafting and bills of material. Greater accuracy in calculation yields design economies which result in material savings.

Scholes, A Christophers, J Jones, CR (British Railways Board) *Railway Engineer* Vol. 3 No. 1, Jan. 1978, pp 42-47, 4 Fig., 3 Ref.

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13 177182

## EFFECT OF CONSTANT POWER TRACTION ON TRANSIT ELECTRIFICATION DESIGN

Modern transit vehicles with electronic feedback speed and torque control may have vehicle power demands which are independent of third rail voltage. Compared to the linear character of resistance controlled vehicles the constant power feature can have a dramatic effect on third rail voltage drop and substation power ratings.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Miller, RH (Bay Area Rapid Transit District); Fernald, GE Brockman, JJ  
Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-IA, 1977, 4 pp

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

13 178284

## REMOTE-CONTROL SYSTEMS AS APPLIED BY THE DB FOR TRACTION CURRENT SUPPLY [Fernwirktechnik im Bereich der Bahnstromversorgung bei der Deutschen Bundesbahn]

No Abstract. [German]  
Seiffert, K *Elsners Taschenbuch de Eisenbahntechnik* DB: Dok 4693, 1978, pp 197-218, 10 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

13 178429

## PROBLEMS RELATING TO THE PROTECTION OF SAFETY CABLES AND TELECOMMUNICATIONS AGAINST CORROSION DUE TO STRAY CURRENT IN D.C. INSTALLATIONS [Probleme des Korrosionsschutzes an SF-Kabelanlagen gegen Streustroeme aus Gleichstrombahnanlagen]

In his analysis of these problems, the author also directs attention to the economic relevance of protection against corrosion on the DR. He goes on to give examples of measurements aimed at reducing stray current between d.c. installations and underground cables, and these show the possibilities of reducing corrosion risks. [German]

Schoen, A *Signal und Schiene* Vol. 21 No. 11, 1977, pp 380-382, 5 Fig., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

13 178430

## SERVICE TESTS ON 6 KV D. C. ELECTRIC TRACTION [Ekspluatatsionnye ispytaniya elektriceskoj tjagi postojannogo toka 6 kV.]

It was in 1960 that the Moscow Energy Institute developed a 1940 kV converter to transform the 3 kV current of VL8 and VL10 electric locomotives into 6 kV current and higher. The article gives some examples of tests carried out on the Trans-Caucasian Railway and the results obtained. [Russian]

Vaciberidze, GS *Zheleznodorozhnyi Transport* No. 1, 1978, pp 53-55, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

13 178431

## PANTOGRAPHS AND CATENARY SUSPENSIONS FOR HIGH SPEEDS [Tokopriemniki i kontaktnye podveski dlja vysokih skorostej]

No Abstract. [Russian]  
Beljaev, IA Vologin, VA *Zheleznodorozhnyi Transport* No. 1, 1978, pp 48-53, 2 Fig., 1 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

13 178536

## MAINTENANCE OF ELECTRIC TRACTION FIXED INSTALLATIONS

Overhead contact lines (or catenaries) age in proportion to the amount of traffic moved. The maintenance of these catenaries involves line possession which is all the more difficult to obtain as the traffic is high. This is the crux of the problem. The article considers the solutions adopted which fall into three categories: 1. simplifications and improvements in the design of equipment; 2. organisation and carrying out of maintenance; 3. the methods employed, conventional methods and above all modern methods, especially the mechanised maintenance trains of which the composition and operation are described in detail. [French]

Boissonnade, P *Revue Generale des Chemins de Fer* Vol. 97 Jan. 1978, pp 26-36

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

13 178686

## UNIFORMLY ELASTIC OVERHEAD CONTACT WIRES FOR HIGH-SPEED ELECTRIC RAILWAYS [Gleichmaessig elastische Fahrleitungen elektrischer Bahnen fuer hohe Geschwindigkeiten]

Ordinary catenary structures are, owing to the suspension of the contact wire and the carrying cable, very unevenly elastic when the upward contact force of the pantograph moves as travelling load along the wire. At high speeds this produces large dynamic forces. Only the partial smoothing effect of the tensioned contact wire makes the present train speeds possible. The article reviews the theoretical possibilities for obtaining a static uniformly elastic contact wire and also indicates how the effects of practical influences, such as friction in the bracket joints, etc., which act against this objective, can be eliminated. [German]

Gerichten, FJ *Eisenbahntechnische Rundschau* Apr. 1978, 3 pp, 4 Fig., 2 Ref.

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

13 178926

## WILL 50 KV BECOME A WORLD STANDARD?

High-voltage ac electrification at 50 or 60 Hz is much cheaper than the medium-voltage dc or low-frequency ac systems developed prior to 1950, but 20 years after 25 kV became the new standard the choice of voltage is once again a matter for debate. For a few years it looked as if 25 kV would continue as the world standard, but a challenge has come from 50 kV in the 1970s based mainly on reduced transmission line and substation costs. While offering some savings where heavy trains are run through empty country, 50 kV seems unlikely to displace 25 kV in general use because clearances must be greater and catenary design is more complex.

Siemens, WH *Railway Gazette International* Vol. 134 No. 4, Apr. 1978, pp 201-204

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

13 178949

## MODERN RAILROAD STATUS REPORT: ELECTRIFICATION

Despite advantages shown in numerous studies, American railroads have no immediate plans for electrification without government financial assistance.

The only active U.S. project is extension of Northeast Corridor electrification from New Haven, Conn., to Boston and a study is being made for Conrail of a similar step for its heavy-traffic line from Harrisburg, Pa., to Pittsburgh. Details of studies and of the Corridor project are included.

Roberts, R. *Modern Railroads/Rail Transit* Vol. 33 No. 6, June 1978, pp 56-58, 2 Phot.

ORDER FROM: ESL

DOTL JC

### 13 179139

#### USE OF COMPUTERS FOR OPTIMUM LOAD DISTRIBUTION ON THE DB [Rechnereinsatz zur optimalen Lastverteilung im 110kV-Bahnstromnetz der DB]

Details of the conditions to be fulfilled as regards power supplies: (a) availability of the necessary capacity at all times, (b) constant voltage with no overloading at any point, (c) efforts to make savings. By using computers power supplies can be provided economically and be constantly kept under supervision. [German]

Niekamp, K. *Elektrische Bahnen* Vol. 49 No. 2, 1978, pp 47-53, 4 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

### 13 179154

#### ELECTRIFICATION AND ENERGY SAVING [Elektrifikacija i energeticeskoe hozjajstvo]

This brochure describes the present situation and future prospects as regards the development of automatic remote control of installations for supplying electrified railway lines with current. It gives particulars on the progressive introduction of this technique, and information on innovations in this context. [Russian]

TsNIITEI Vol. 6 No. 104, 1977, 29 pp, 1 Tab., 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: TsNIITEI, Raushskaia Nab 4, Moscow 113035, USSR

### 13 179269

#### RAILROAD ELECTROMAGNETIC COMPATIBILITY. VOLUME I. ELECTRIFICATION BIBLIOGRAPHY

In an effort to provide a single source of referable material concerning electromagnetic interference/electromagnetic compatibility (EMI/EMC) associated with railroad electrification, a special document was prepared for the Federal Railroad Administration. This bibliography is the result of that effort and contains numerous abstracts of mixed foreign and domestic material. The abstracts are compiled from previous published bibliographies on related subjects, with special attention given to the Railroad Research Information Service File. The material in this document is categorized into the following subject topics: Catenary System, Electrification, Power Transmission Line, Signalling and Telecommunication, Substation, Track Circuit, Traction Control System and Miscellaneous.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Project part of overall effort on railroad electromagnetic compatibility study-investigation according to research plan FRA/OR&D 77/44 addendum #1 dated September 1977. Volume II--Railroad Electromagnetic Compatibility; Assessment for Classification Yards and Electrification, FRA/ORD-77/77.II to be published.

Young, J O'Neill, D

Electromagnetic Compatibility Analysis Center Final Rpt. FRA/ORD-77/77.I, ECAC-CR-78-009, Mar. 1978, 122 pp

Contract AR 74311

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-281705/AS, DOTL NTIS, DOTL RP

### 13 179289

#### SELECTED BIBLIOGRAPHY OF WORLD LITERATURE ON ELECTRIC TRACTION FOR RAILROADS, 1970-1976

No Abstract.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Macie, TW

Jet Propulsion Laboratory Bibliog. FRA/ORD-77/42, Aug. 1977, 146 pp

Contract DOT-AR-30006 Amend 5

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-265469/AS, DOTL NTIS, DOTL TF857.M13, DOTL RP

15 166511

**TRANSPORTATION IN AMERICA'S FUTURE: POTENTIALS FOR THE NEXT HALF CENTURY. PART 2. TRANSPORTATION FORECASTS**

Contents: Transportation demand and energy estimates; Transportation trends and issues under three futures for 1995; Prospects for new and improved transportation systems by 2025 (Air, Avionics, Shipping, Pipelines and tunnels, Railroads, Intercity buses, Highways and streets, Trucking, Automobiles, Urban transit and rail, Paratransit, Pedestrian aids and bikeways, Elderly and handicapped services); Electric and hybrid automobiles; Innovative urban systems; Automated highway system; A generic approach to advanced freight systems; Tracked levitated vehicles, improved passenger trains and buses; The successful SST; Some transportation implications of future telecommunications technology; Transportation problems and opportunities.

See also Part 1, PB-270467.

Curry, D Carlson, R Henderson, C Mandel, T Mitchell, A  
Stanford Research Institute, Department of Transportation, (SRI-URU-5040) Final Rpt. DOT/TPI/20-77/21-2, June 1977, 343 pp

Contract DOT-OS-60160

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-270468/2ST, DOTL NTIS

15 169106

**TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME II. DETAILED IMPACT ANALYSES**

This 'technology assessment' identified and analyzed the social, economic and environmental consequences of possible future changes in the relationships between telecommunications and transportation. The report includes 30 in-depth impact analyses and a 1090-entry bibliography.

See also PB-272693-SET/ST, RRIS 15 169108; RRIS Bulletin 7802. Also available in set of 3 reports PC E17, PB-272 693-SET.

Harkness, RC

Stanford Research Institute, National Science Foundation, (SRI-4293)

Final Rpt. NSF/RA-770158, May 1977, 1058 pp

Contract NSF-C1025

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272695/8ST

15 169107

**TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME I. INTRODUCTION, SCENARIO DEVELOPMENT, AND POLICY ANALYSIS**

This technology assessment identified and analyzed the social, economic and environmental consequences of possible future changes in the relationships between telecommunications and transportation. Scenarios were used to describe these changes. Effort was focused on three types of scenarios: (1) audio or audio-video teleconferencing as a substitute for face-to-face meetings and business travel by air or auto, (2) increased decentralization of office employment from city centers to suburban locations resulting from more teleconferencing and thus less need for physical agglomeration, and (3) office employees using terminals to work at home or in neighborhood office centers near home. The scenarios were found to have significant implications for energy conservation, urban development, commuting, mass transit, job accessibility for persons unable to commute, communications within organizations, residential locational freedom, the telecommunications industry, the airline industry, and other areas. This concept of moving information to people is offered for widespread consideration by planners, policy-makers, industry, and the public.

See also PB-272693-SET/ST, RRIS 15 169108; RRIS Bulletin 7802. Also available in set of 3 reports PC E17, PB-272 693-SET.

Harkness, RC

Stanford Research Institute, National Science Foundation, (SRI-4293)

Final Rpt. NSF/RA-770157, May 1977, 195 pp

Contract NSF-C1025

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272694/1ST

15 169108

**TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS**

No abstract available.

Set includes PB-272694 thru PB-272696, Volume I-III, RRIS 15 169107, 169106 and 169105 respectively in RRIS Bulletin 7802.

Stanford Research Institute, National Science Foundation 3 volumes, May 1977, 1380 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272693-SET/ST

15 169227

**POTENTIAL FOR BETTERMENT--DISTRICT FINANCING AND JOINT DEVELOPMENT APPLICATIONS TO SURFACE TRANSIT**

The report proposes a general methodology for evaluating land use and investment activity with respect to land in the vicinity of surface transit facilities. The three major objectives were: (1) to determine if there are incremental benefits accruing to land near bus, trolley, and by inference light rail facilities; (2) to examine equity issues in potential tax benefit districts serving such facilities; and (3) to examine the potential of joint development with respect to surface transit. An underlying objective was the presentation of an interactive spatial analysis system suited to the small-scale study of transit system impacts and relationship to their environment. Primary focus was directed to exploring locations in the vicinity of multiple routes where levels of commercial and multi-family new investment might be particularly high. The study concludes that the use of special benefit districts would be difficult to operationalize and that joint development opportunities are encouraging.

Shawcroft, RG Horwood, EM Lester, MS

Washington University, Seattle, Urban Mass Transportation

Administration, (UMTA-WA-11-0005) Res Rpt. UMTA-WA-11-0005-77-1, RR-77-7, July 1977, 65 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274618/8ST, DOTL NTIS

15 169261

**TRANSIT'S ROLE IN THE CREATION OF THE POLYCENTRIC CITY: AN INITIAL ASSESSMENT**

The report investigates the role of transit in aiding the implementation of land use plans that call for the creation of major diversified centers in the outer city. The polycentric city concept is defined and illustrated by reference to regional planning work in the Twin Cities of Minnesota. Arguments for and against the concept are outlined and the results of a survey relating to the present status of the concept are presented. An evaluation framework is developed and applied in visits to ten American and two Canadian urban regions. The most interesting work on this topic was found in Vancouver, B.C., and Toronto, Ontario. Other interesting work has been done in the Twin Cities and San Diego. The results of the field work are summarized and seven specific examples of noteworthy progress toward the development of outer city centers of significant scale are described.

Schneider, JB Noguchi, T

Washington University, Seattle, Urban Mass Transportation

Administration, (UMTA-WA-11-0005) Res Rpt. UMTA-WA-11-0005-77-2, RR-77-6, Aug. 1977, 256 pp

ACKNOWLEDGMENT: NTIS, UMTA

ORDER FROM: NTIS

PB-275043/8ST

15 173389

**ECMT. ROUND TABLE 36 (29-30 NOVEMBER 1976)--COST-BENEFIT ANALYSIS**

The Round Table (21 participants) examined the problems arising from the practical application, from the political standpoint and in the transport sector, of methods of aid to decision-making, such as cost-benefit analyses. The report outlines the difficulties encountered in terms of choice of procedures (lack of data, non-quantifiable problems, choice of methods, etc.), and defines the conditions essential for ensuring efficiency. The report, which is supplemented by a technical document and a bibliography, contains an appendix giving examples as well as a summary of the proceedings. [French]

Frost, MJ

European Conference of Ministers of Transport Proceeding UIC Cat. 01 N167, 1977, 120 pp, 1 Fig., 4 Tab., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006

15 173390

**SOCIAL WELFARE ECONOMICS AND THE DEFICITS OF PUBLIC ENTERPRISES: THE EXAMPLE OF SWISS FEDERAL RAILWAYS [Wohlfahrtsoekonomie und Defizite oeffentlicher Unternehmungen: Das Beispiel der Bundesbahnen]**

By using the example of the CFF, this article discusses under what circumstances and to what extent the large deficits of public railway companies may be justified by the concept of social welfare economics. Factors examined include reduced average costs, the political aims of allocation, external factors and, most important, the problem of the "second best". [German]

Blankart, CB *Schweizerische Zeit fuer Volkswirtschaft & Statist* Vol. 113 No. 4, 1977, pp 425-446, 3 Tab., 2 Phot., 27 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Schweizerische Gesell fuer Statistik &amp; Volkswirts, Hallwylstrasse 15, CH-3003 Berne, Switzerland

15 173575

**THE URBAN RAILROAD SITUATION**

Growth of our cities around rail facilities has often resulted in incompatibilities between the railroads and communities in metropolitan core areas. Explored in the following is the development of the current urban railroad situation; some specific areas of incompatibility in central cities are presented, and certain relationships to ensure the success of the solutions are considered.

Moore, JR Viser, BB (Bartholomew (Harland) and Associates) *Transportation Engineering* Vol. 47 No. 6, June 1977, pp 29-33

ACKNOWLEDGMENT: General Motors Research Laboratories

ORDER FROM: Institute of Transportation Engineers, 1815 North Fort Myer Drive, Suite 905, Arlington, Virginia, 22209

DOTL JC

15 174348

**RAILROAD ABANDONMENT AND THE SMALL COMMUNITY: FIVE CASE STUDIES**

This report addresses the problems of railway line abandonment, particularly in New England towns. The main thrust is to discover how abandonment affects a community and especially its small businessman many of whom are absolutely rail dependent. It questions whether a comprehensive analysis of these impacts, satisfactory to community and railroad interests, is possible. As a case study, the report does not make cost extrapolations, but rather draws its conclusions from the opinions of the individual businessmen and government officials who deal with the New England railroads in their day to day transactions. The study is divided into two parts. The first is an overview of the historical and legal evolution of the railroad problem. The second reports on the case studies of several New England towns served by the bankrupt Penn Central lines that have either been abandoned in the last three years or are threatened with abandonment under the Railroad Reorganization Act of 1973.

Vitteck, JF, Jr Lambert, E Polito, M  
Massachusetts Institute of Technology CTS-76-5, Mar. 1976, 70 pp, 32 Ref., 1 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

15 175108

**SOUTHERN HOBOKEN DEVELOPMENT STUDY PROJECT**

A field survey of the Southern Hoboken area was undertaken to determine land use, vacant land, building use, building conditions, industrial activities and railroad activities. The results of these surveys are summarized in the study.

Hoboken Office of Community Development, Economic Development Administration Final Rpt. EDA-78-006, Nov. 1977, 315 pp

ACKNOWLEDGMENT: NTIS

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PB-275720/1ST

15 175891

**PROCEEDINGS YEAR 2000 ALTERNATIVE TRANSPORTATION FUTURES CONFERENCE, MARCH 10, 1976**

Many factors will affect the needs, performance, costs and impacts associated with the Chicago region's transportation system during the next 25 years. The 'ranges' workshops were concerned with selection of variables and definition of ranges of values and covered the following topics: energy, regional economy, technology, financial resources, regulatory directions, and societal attitudes. The document also contains profiles of the three futures defined by the conference. Each of the three profiles represents a possible outcome of changes in energy availability as defined by the conference. The energy abundant future is characterized by price stability for petroleum fuels, no increase in the rate of substitution for those fuels, and no change in the substitution of communications for transportation. At the other extreme, the energy scarce future is characterized by a four-fold increase in energy price and a relatively large shift to various other nonpetroleum fuel sources for transportation. The intermediate future defined by the conference is, as expected, somewhere between the two extremes. The products of this, the Chicago region's first experience with exploring the future in a conference setting, should be applicable to the long range transportation planning process in the area. While it is apparent that the conference results cannot serve as inputs to forecasting models, they can color three major aspects of the planning process: definition of alternative plans, demand estimation and performance testing, and evaluation of alternative plans.

Sponsored in part by Northwestern Univ., Evanston, Ill.

Biciunas, AE Moses, LN

Chicago Area Transportation Study, Northwestern University, Evanston 1976, 143 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277456/OST

15 178439

**BUILDING ON TOP OF RUNNING TRACK [Verkehrs-Trassen-Ueberbauungen]**

This concept involves building above track for other than strictly operating purposes, and creating multi-story complexes within the context of an integrated urban renovation plan. The report gives 50 examples of recent projects undertaken in various countries. [German]

Bernardi, K Feinhals, G

Verlag Georg DW Callwey 1977, 132 pp, 400 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Verlag Georg DW Callwey, Streitfeldstrasse 35, 8000 Munich 80, West Germany

15 179129

**INTER-URBAN RAIL PASSENGER SERVICE-SOCIAL BENEFITS OF RETAINING THE SOUTH SHORE RAILROAD**

This paper deals with the subsidization of South Shore Railroad passenger service between northern Indiana and Chicago. The costs to counties in the South Shore corridor for capital outlays for new cars and the relocations of terminals were well documented, yet little was known about the benefits of retaining the service.

Joray, PA Kochanowski, PA *Logistics and Transportation Review* Vol. 14 No. 1, 1978, pp 81-89, Refs.

ACKNOWLEDGMENT: Logistics and Transportation Review

ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

15 179977

**EFFECTS OF BART ON URBAN DEVELOPMENT**

The research objectives of the BART Impact Program Land Use and Urban Development Project are summarized, and the results of studies of BART's accessibility impacts and their importance in explaining: (1)Regional shifts in employment and population; and (2)BART's effects on the office construction and housing industries are presented. A preliminary analysis of regional trends since 1950 indicates that BART has not measurably affected

population and employment growth within the corridors it serves. Changes in the office construction and housing industries within the three-county BART service area are covered, and BART's role in timing and location decisions is analyzed. Topics yet to be addressed in the research project are highlighted and the implications of these preliminary findings are described.

Dyett, MV (Blayney (John) Associates); Escudero, E *ASCE Journal of Transportation Engineering* Vol. 104 No. 3, May 1978, pp 239-251, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

15 180026

**CHANGE AND DISCONTINUITY. FORECASTING FOR THE 1980S**

This outline of forecasting takes a very broad view covering many of the diverse approaches now available--so that attention can be paid to the role

of forecasting in discovering and analyzing alternatives, as well as to its established role in prediction. The philosophy of forecasting and the differing methodological approaches are discussed, highlighting particularly the problem of continuity and discontinuity in change, and the concepts of the cultural barrier and the paradigm shift. The paper, applying the idea of discontinuity in social change (the paradigm shift), examines some possibilities for the 1980s. It argues that in the field of social forecasting, which is now becoming an important element in all other types of forecasting, the forecaster's capability to foresee broad changes in values is crucial, since such changes will themselves lead to further developments throughout society.

Holroyd, P (Pilkington Brothers Limited, England) *Future of American Transportation* Vol. 10 No. 1, Feb. 1978, pp 31-43, 16 Ref.

ACKNOWLEDGMENT: EI

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16 166779

**ENERGY EFFICIENCY IMPROVEMENT TARGET  
TRANSPORTATION EQUIPMENT INDUSTRY (SIC 37).  
VOLUME 1**

In accordance with section 374 of the Energy Policy and Conservation Act (EPCA), Pub. L. 94-163, the Federal Energy Administration (FEA) proposed industrial energy efficiency improvement targets for the ten most energy-consumptive manufacturing industries in the United States. This proposed target is based on the best available information and is established at the level which represents the maximum feasible improvement in energy efficiency that the Transportation Equipment Industry (Standard Industrial Classification 37) can achieve by January 1, 1980, taking into account considerations of the technological feasibility and economic practicability of using alternative operating procedures and more energy efficient technologies. The draft target represents the percentage reduction in energy consumed per unit of output or activity that can be achieved between calendar year 1972 and January 1, 1980.

See also Vol. 2 Industrial Programs, Conservation and Environment, Target Support Document, and Vol. 3, Final Target Document Paper copy also available in set of 3 reports PC E11, PB-270 067-SET.

Kearney (AT) Incorporated, Federal Energy Administration  
FEA/D077/259, July 1976, 430 pp

Contract FEA-CR-04-60612

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-270068/OST

16 166780

**ENERGY EFFICIENCY IMPROVEMENT TARGETS FOR THE  
TRANSPORTATION EQUIPMENT INDUSTRY (SIC 37).  
VOLUME 2. INDUSTRIAL PROGRAMS, CONSERVATION AND  
ENVIRONMENT. TARGET SUPPORT DOCUMENT**

In accordance with section 374 of the Energy Policy and Conservation Act (EPCA), Pub. L. 94-163, the Federal Energy Administration (FEA) proposed industrial energy efficiency improvement targets for the ten most energy-consumptive manufacturing industries in the United States. This proposed target is based on the best available information and is established at the level which represents the maximum feasible improvement in energy efficiency that the Transportation Equipment Industry (Standard Industrial Classification 37) can achieve by January 1, 1980, taking into account considerations of the technological feasibility and economic practicability of using alternative operating procedures and more energy efficient technologies. The draft target represents the percentage reduction in energy consumed per unit of output or activity that can be achieved between calendar year 1972 and January 1, 1980.

See also Volume 1, PB-260 068. Paper copy also available in set of 3 reports PC E11, PB-270 067-SET.

Kearney (AT), Incorporated, Federal Energy Administration  
FEA/D-77/260, July 1977, 259 pp

Contract FEA-CR-04-60612

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-270069/8ST

16 166781

**ENERGY EFFICIENCY IMPROVEMENT TARGETS FOR THE  
TRANSPORTATION EQUIPMENT INDUSTRY(SIC 37). VOLUME  
3. FINAL TARGET DOCUMENT**

In accordance with section 374 of the Energy Policy and Conservation Act (EPCA), Pub. L. 94-163, the Federal Energy Administration (FEA) proposed industrial energy efficiency improvement targets for the ten most energy-consumptive manufacturing industries in the United States, and invited the oral and written presentation of views thereon by interested persons. Following public hearings and review of the written comments which were submitted to FEA, the final targets for Transportation Equipment (Standard Industrial Classification 37) have been developed and are described in this report.

See also Volume 2, PB-270 069. Paper copy also available in set of 3 reports PC E11, PB-270 067-SET.

Kearney (AT), Incorporated, Federal Energy Administration  
FEA/D-77/261, Jan. 1977, 134 pp

Contract FEA-CR-04-60612

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-270070/6ST

16 169008

**SYSTEM DYNAMICS MODEL OF NATIONAL ENERGY USAGE**

This report presents a system dynamics model of energy usage with particular application to the national level, although the model could be used at other levels with suitable modifications. The model simulates: (1) growth in the energy usage sectors of industry, residential-commercial, transportation, and electric utilities, and (2) the depletion of the primary energy sources of coal, oil, natural gas, and uranium. The sectors in the model are highly coupled through numerous feedback loops which reflect the influence of each sector of the energy economy upon the others. The model is versatile in the sense that new energy technology can be introduced with minimal effort. A detailed description of the model is given, and a number of examples of its application are described. (ERA citation 02:045692)

Sasser, DW

Sandia Laboratories, Energy Research and Development Administration  
Dec. 1976, 87 pp

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

SAND-76-0415

16 169014

**TRANSPORTATION ENERGY CONSERVATION DATA BOOK:  
SUPPLEMENT III**

This document is Supplement III to Edition I of the Transportation Energy Conservation Data Book (ORNL-5198; EAPA 3:527), which was published by Oak Ridge National Laboratory in October 1976. This series of documents is intended to provide a desk-top reference for use by the Transportation Energy Conservation Division of the Energy Research and Development Administration. The supplements contain statistics that expand and refine data presented in Edition I. A variety of tables, charts, maps, and graphs is used in this volume to present statistical data on energy use and energy-related activity in the transportation sector. A major aspect of the data in this supplement focuses on energy supply to the transportation sector. Data on characteristics of transportation modes, fuel consumption characteristics, and conservation alternatives are also included in this supplement and serve to augment and update information presented in Edition I. The glossary represents a significant expansion. A list of references is provided, an index, and an annotated bibliography (showing recent acquisitions) are included at the end of this supplement. (ERA citation 02:043490)

See also Edition I, RRIS 16, 151266 in RRIS Bulletin 7801.

Loebl, AS

Oak Ridge National Laboratory, Energy Research and Development  
Administration May 1977, 155 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

ORNL-5248

16 169015

**CONSENSUS FORECAST OF U.S. ELECTRICITY SUPPLY AND  
DEMAND TO THE YEAR 2000**

Recent forecasts of total electricity generating capacity and energy demand as well as for electricity produced from nuclear energy and hydroelectric power are presented in tables and graphs to the year 2000. A forecast of the distribution of type of fuel and energy source that will supply the future electricity demand is presented. Use of electricity by each major consuming sector is presented for 1975. Projected demands for electricity in the years 1985 and 2000, as allocated to consuming sectors, are derived and presented. (ERA citation 02:045725)

Available from ERDA, P.O. Box 62, Oak Ridge, TN 37830, Attn: TIC.

Lane, JA

Oak Ridge National Laboratory, Energy Research and Development  
Administration Feb. 1976, 11 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

ORNL/TM-5370

16 169016

**CONSENSUS FORECAST OF U.S. ENERGY SUPPLY AND DEMAND TO THE YEAR 2000**

Methods used in forecasting energy supply and demand are described, and recent forecasts are reviewed briefly. Forecasts to the year 2000 are displayed in tables and graphs and are used to prepare consensus forecasts for each form of fuel and energy supply. Fuel demand and energy use by consuming sector are tabulated for 1972 and 1975 for the various fuel forms. The distribution of energy consumption by use sector, as projected for the years 1985 and 2000 in the ERDA-48 planning report (Scenario V), is normalized to match the consensus energy supply forecasts. The results are tabulated listing future demand for each fuel and energy form by each major energy-use category. Recent estimates of U.S. energy resources are also reviewed briefly and are presented in tables for each fuel and energy form. The outlook for fossil fuel resources to the year 2040, as developed by the Institute for Energy Analysis at the Oak Ridge Associated Universities, is also presented. (ERA citation 02:045690)

Lane, JA

Oak Ridge National Laboratory, Energy Research and Development Administration Feb. 1976, 31 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

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ORNL/TM-5369

16 169490

**TRANSPORTATION ENERGY CONSUMPTION AND CONSERVATION POLICY OPTIONS IN THE NORTHEAST**

This report presents a profile of 1972 transportation energy consumption in the Northeast region. Transportation energy projections for the region are given by mode for the years 1985 and 2000. Conservation actions which could significantly affect future transportation energy demand levels are described and their impacts evaluated. It is estimated that while the demand for energy in the transportation sector might increase by as much as 88% by the year 2000, strong conservation actions could reduce the projected level of demand by over 30%. Recent changes in the growth and distribution of population and industrial and commercial activities are reviewed. Both the factors that affect these growth and distribution patterns and the implications of changes in existing patterns on energy use in the transportation sector are discussed. It is shown, for example, that land-use controls could substantially reduce the growth of energy demand in the transportation sector. Finally, conservation actions are discussed within the context of how they might be implemented by Federal, State, or local governments. Interactions between actions are discussed and groupings of actions that minimize the disadvantages of individual actions while taking advantage of complementary effects between actions are presented. (ERA citation 02:052091)

Brookhaven National Laboratory, Energy Research and Development Administration Apr. 1976, 163 pp

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS

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BNL-50554

16 169509

**FUEL AND ENERGY PRICE FORECASTS. FINAL REPORT. VOLUME I. REPORT**

This study of fuel and energy prices over the period 1985 to 2000 projects energy prices in 1975 constant dollars, on a regional basis, for the United States. The major sources of energy analyzed include crude oil and major petroleum products, coal and coal-based synthetic fuels, gas, and uranium. It was stipulated that price projections were to be developed within a given set of aggregate energy and electricity demand projections, as set out in the Edison Electric Institute study, *Economic Growth in the Future*. The price of each energy type is projected at different levels of commerce (e.g., points of production and points of consumption), requiring a forecast of the cost of production, transportation, and distribution. Delivered energy prices were estimated for four major end-use sectors: residential/commercial, industrial, electric utility, and transportation. Two major findings of the study are: (1)

the real prices of all sources of energy will increase over the forecast period; both gas and petroleum prices will continue to increase at a rate greater than that of coal, primarily reflecting the higher cost of incremental supplies; uranium prices are also projected to increase, but could remain below that for coal delivered to the electric utility sector; and (2) the ranges of energy price projections are attended in varying degree of great uncertainty; the bands of uncertainty, set out for each forecast, are considered as important as the price projections. (ERA citation 02:048871)

Schantz, R Mikutowicz, W Foster, W

Foster Associates, Incorporated Apr. 1977, 264 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

EPRI-EA-411(V.1)

16 169510

**FUEL AND ENERGY PRICE FORECASTS. FINAL REPORT. VOLUME II. SCHEDULES**

Volume II is a compilation of schedules on information contained in two chapters of Vol. I: Chapter III, Projected Prices for Major Sources of Energy and Chapter IV, Inter-Energy Prices Projected for Major Consuming Sectors. (ERA citation 02:048872)

Schantz, R Mikutowicz, W Foster, W

Foster Associates, Incorporated Apr. 1977, 190 pp

ACKNOWLEDGMENT: NTIS

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EPRI-EA-411(V.2)

16 169600

**THE ENERGY SUPPLY PLANNING MODEL. VOLUME I. MODEL STRUCTURE AND USE**

In late 1973, a growing national perception of the degree of U.S. dependence on foreign oil supplies stimulated the proposal of several U.S. energy policies. These policies were generally aimed at reducing, or at least varying, demand for specific energy forms and devising different schemes to supply sufficient energy from domestic resources at the earliest possible data. To compare and evaluate these proposals, a means was desired for converting the proposed policies into strategies and programs that would establish, primarily, 'critical path facilities' and, in so doing, would make possible judgements on the feasibility of the proposed policies. After some reflection on the complexities of an undertaking of this kind, it was decided to generate a consistent means of converting proposed U.S. energy supply policies to annual schedules of facilities and the capital, manpower, and material resources required to bring them on-line. This, it was believed, would constitute the first step toward determining the feasibility of proposed policies. This report documents the study. The structure and function of the Energy Supply Planning Model are described and its use illustrated. Both the modeling effort and the development of the supporting data base are at a point where the model may be used intelligently for energy supply planning.

See also Volume 2, PB-245383, RRIS 16 169601; RRIS Bulletin 7802.

Carasso, M Gallagher, JM Sharma, KJ Gayle, JR Barany, R  
Bechtel Corporation, National Science Foundation Final Rpt.  
NSF-10900-II-1, Aug. 1975, 244 pp

Contract NSF-C867

ACKNOWLEDGMENT: NTIS

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PB-245382/7ST

16 169601

**THE ENERGY SUPPLY PLANNING MODEL. VOLUME II. USER'S MANUAL AND APPENDICES**

The specific modeling work reported here was stimulated by the need to explore the feasibility of proposed U.S. energy policies in terms of the requirements for specific societal resources associated with the construction and operation of energy supply and energy transportation facilities needed to implement these energy supply policies. The Energy Supply Planning Model is designed to convert future (1975 to 1995) energy mixes to resource requirements schedules. With this planning tool, the feasibility of various proposed mixes can be assessed in terms of the time, capital, manpower, materials, and construction schedules required for the specified energy supply system. In carrying out the modeling efforts, special emphasis was placed on developing a rather transparent planning model where the user can test the implications of different energy policy options.

See also Volume 1, PB-245 382.

Carasso, M Gallagher, JM Sharma, KJ Gayle, JR Barany, R  
Bechtel Corporation, National Science Foundation Final Rpt.  
NSF-10900-II-2, Aug. 1975, 331 pp

Contract NSF-C867

ACKNOWLEDGMENT: NTIS  
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PB-245383/5ST

16 170820

**ENERGY EFFECTS, EFFICIENCIES, AND PROSPECTS FOR VARIOUS MODES OF TRANSPORTATION**

Conservation of energy used for transportation is of vital concern to the nation. This report of the Transportation Research Board details the efficiencies of various vehicles and modes for both passengers and freight under various conditions. Modes considered include highway, bus, rail, air, water, bicycle, and pipelines. The potential impacts of alternative energy-conservation options are evaluated, and research needs are identified.  
/Author/

NCHRP Project 20-5 FY' 75 (Topic 7-05) sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

*NCHRP Synthesis of Highway Practice* No. 43, 1977, 57 pp, 21 Fig., 40 Tab., 59 Ref., 2 App.

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16 170938

**ENERGY SAVINGS IN TRANSPORT [Les economies d'energie dans les transports]**

This is a summary of a study carried out at the request of the Ministry of the Economy, following the general principles of rationalization of budgetary choices, into savings in fuel consumption with private cars and road freight transport. In addition, there are a few thoughts on better harmonization of methods in the choice of road and rail investments. [French]

Touzery, L *Rationalisation des Choix Budgetaires (RCB)* No. 30, Sept. 1977, pp 24-32

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ministere de l'Economie et des Finances, Documentation Francaise, 29-31 Quai Voltaire, 75340 Paris Cedex 07, France

16 173149

**AN ANALYSIS OF ENERGY USE BY PASSENGER TRANSPORT IN THE U.K.**

Since 1973 when the OPEC countries quadrupled the price of crude oil, energy policy in transport has become more important. This paper aims to clarify the situation by presenting an analysis of energy use in passenger transport, with particular emphasis on urban areas.

Maltby, D *Traffic Engineering and Control* Vol. 18 No. 12, Dec. 1977, 5 pp, 15 Tab., 5 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

16 173155

**LUBRICATING OIL ANALYSIS: AN EFFECTIVE MAINTENANCE TOOL**

Lubricating oil analysis serves as a diagnostic tool for equipment maintenance in transportation and heavy industry. The lubricant sample is analyzed for presence and amount of various contaminants such as wear metals, dust and dirt, fuel, coolant, oxidation products, and nitration. Evaluation of these analyses determine if excessive wear of internal oil-wetted parts is occurring and can pinpoint defects in filtration, cooling, and fuel systems. The advantages offered by the direct reading automatic analyzers are discussed.

Starling, RC (Optimal Systems, Incorporated); Homer, KE *Diesel and Gas Turbine Progress* Vol. 43 No. 10, Oct. 1977, pp 74-75

ACKNOWLEDGMENT: EI  
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DOTL JC

16 173393

**RATIONAL USE OF ELECTRIC ENERGY [Rezervy ekonomii elektroenergii]**

No Abstract. [Russian]

Tarasovskij, VF *Elektricheskaya i Teplovoznaia Tiaga* No. 9, 1977, pp 24-25

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

16 173434

**USE OF LOW-GRADE FUEL FOR DIESEL LOCOMOTIVES ON THE RAILWAYS [Primena niskovrednih dizel-goriva u zeleznickim dizel-motorima]**

No Abstract. [Serbo-Croatian]

Mihailovic, D *Zeleznice* Vol. 33 No. 12, Dec. 1977, pp 12-16

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Zeleznice, Belgrade, Yugoslavia

16 173590

**DIESEL ENGINE LUBRICANTS SWITCH TO GENERATION 4**

The highly dispersant Generation 3 diesel engine lubricating oils introduced about seven years ago are widely used and generally perform very well, but present trends in engine design and operation are making increasingly severe demands on these oils. For this reason, a new type of oil known as Extra Performance or Generation 4 has been developed, and it is expected that such oils will begin to enter commercial service this year. They offer higher alkalinity, even better dispersancy, and greater resistance to thermal breakdown.

Golothan, DW (Shell International Petroleum Company Limited) *Railway Gazette International* Vol. 134 No. 3, Mar. 1978, pp 123-125, 1 Fig., 6 Phot.

ACKNOWLEDGMENT: Railway Gazette International  
ORDER FROM: ESL

DOTL JC

16 173786

**ENERGY REQUIREMENTS OF THE RAIL MODE**

The results of computer simulations of railroad operations to determine the energy required to pull freight and passenger trains over mountainous and flat profiles is presented. The effect of variations in average speed, profile and types of freight cars, is also determined. The potential for recovering braking energy on mountainous grades and during passenger service with frequent stops is evaluated.

Contributed by the Rail Transportation Division of ASME for presentation at the Rail Transportation Conference, St. Paul, Minnesota, April 11-12, 1977.

Addie, AN Concannon, BT  
American Society of Mechanical Engineers Conf Paper 78-RT-1, 1978, 8 pp, 16 Fig., 3 Tab., 5 Ref., 2 App.

ACKNOWLEDGMENT: ASME  
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DOTL RP

16 174030

**BETTER UTILIZATION OF ENERGY SHOWN AT THE EXAMPLES OF RAILROADS AND DISTRICT HEATING [Wege zum Rationellen Energieverbrauch, Gezeigt am Beispiel des Schienenverkehrs und des Niedertemperaturwaermebedarfs]**

The article presents two examples of rational utilization of energy. The emphasis is placed on heat pumps operated by gas engines that require less energy both for heating and hot water supply. The switching from steam locomotives to diesel engines or electric locomotives has greatly reduced the consumption of energy. [German]

Bauermeister, K (German Federal Railway); Brecht, C Schaefer, H Stoy, B *Brennstoff - Waerme - Kraft* Vol. 29 No. 9, Sept. 1977

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL



16 174186

**INFLUENCE OF CERTAIN OXYGEN-CONTAINING COMPOUNDS ON PROTECTIVE PROPERTIES OF DIESEL FUELS**

The reported experiments were concerned with the problem of improving the protective properties of diesel fuels. It has been established that the addition of surface-active substances to diesel fuels gives considerable improvement in protective properties. This paper presents results from a study of the protective efficiency of various oxygen-containing functional groups, with the aim of drawing up recommendations for the development of protective additives. The selection of oxygen-containing compounds as the class to be investigated was based on the low corrosivity of these materials in comparison with sulfur-containing compounds, together with the relatively high polarity of these compounds. A total of 14 different compounds were tested--alcohols, ketones, lactones, acids, and esters--all with purities of 99.9% as determined by GLC. All these compounds were tested at a concentration of 1% in n-decane, with the aim of determining the feasibility of comparing the test results with the results from analyses of mixtures of IR spectroscopy. Experimental data are presented and evaluated. It is demonstrated that the addition of oxygen-containing compounds that are capable of retarding electrochemical corrosion processes in a hydrocarbon/-water/metal system and of being adsorbed on the metal through electron-donor interaction improves the protective properties of such a medium quite considerably. Particular attention is given to the water-insoluble carboxyl compounds which should be investigated as a component in the development of effective protective additives for fuels.

Gureev, AA Shostakovskii, VM Timokhin, IA Churshukov, ES Egorova, KA Sklovskaya, EB *Chemistry and Technology of Fuels and Oils* Vol. 13 No. 3-4, Mar. 1977, pp 206-208, 6 Ref.

ACKNOWLEDGMENT: EI

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16 174190

**EFFICIENCY OF ANTIWEAR ADDITIVES IN GREASES FOR JOURNAL BOXES OF RAILROAD CARS**

Operating experience with railroad cars equipped with journal boxes with cylindrical roller bearings has shown that one of the most dangerous types of damage, leading to breakdowns and accidents, is wedging and spalling of the rollers and the rims of the races. The reported experiments were devoted to the study of antiwear properties of various additives in lubricating greases used in railroad cylindrical roller bearings. These studies were performed in a MT-TsNII laboratory friction tester which is shown schematically. In the first series of experiments, the critical load was determined, i.e., the highest load at which the coefficient of friction remained at the level of 0.3-0.5 during the entire course of the test run at this particular load step. Results are presented which show that, in obtaining reliable and breakdown-free operation of cylindrical roller bearings installed in rail-car journal boxes, the governing factor is found in those changes in friction-surface microgeometry occurring under the influence of the lubricating media in the process of sliding. There is every reason to believe that this index of lubricant properties must also be very important for other frictional assemblies in which the operating conditions permit short-term changeovers of hydrodynamic lubrication into boundary lubrication.

Zhdanov, IP Podol'skii, YY Tsurkan, IG *Chemistry and Technology of Fuels and Oils* Vol. 13 No. 3-4, Mar. 1977, pp 285-288, 6 Ref.

ACKNOWLEDGMENT: EI

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16 174442

**FOURTH NATIONAL CONFERENCE EFFECTS OF ENERGY CONSTRAINTS ON TRANSPORTATION SYSTEMS: PROCEEDINGS**

The major goal of the conference was to bring experts and interested participants together so that necessary information could be freely exchanged. Topics of discussion included: Energy and Transportation Facts and Figures; Long Range Planning Under Energy Constraints; Technology Assessment of Alternative Fuels; Energy Efficiency of Intercity Passenger and Freight Movement; Energy Efficiency of Intracity Passenger Movement; Federal Role; Electrification of Railroads; Energy Impact of Electric Car in an Urban Environment; Research Needs and Projects in Progress--Federal Viewpoint; Research Needs in Transportation Energy Conservation--Data Needs; Energy Intensity of Various Transportation Modes--An Overview.

The conference was composed of a series of lectures, panel discussions and question and answer sessions. It is expected that the conference will help to disseminate energy data and find ways for conserving energy within the transportation sector.

This conference was held at Union College, Schenectady, New York, August 1-5, 1977 and co-sponsored by the U.S. Department of Energy.

Union College Proceeding CONF-770878, Dec. 1977, 544 pp, Figs., Tabs., Photos., Refs., 1 App.

Contract EC-77-G-01-60-67

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16 174915

**TRANSPORTATION ENERGY CONSERVATION DATA BOOK: EDITION 1.5**

This document contains statistical information on the major transportation modes, their respective energy consumption patterns, and other pertinent factors influencing performance in the transportation sector. Data relating to past, present, and projected energy use and conservation in the transportation sector are presented under seven chapter headings. These focus on (1) modal transportation characteristics, (2) energy characteristics of the transportation sector, (3) energy conservation alternatives involving the transportation sector, (4) government impacts on the transportation sector, (5) the supply of energy to the transportation sector, (6) characteristics of transportation demand, and (7) miscellaneous reference materials such as energy conversion factors and geographical maps. References are included for each set of data presented, and a more general bibliography is included at the end of the book. In addition, a glossary of key terms and a subject index is provided for the user. A second edition of this document is scheduled for publication in September 1977. (ERA citation 02:052010)

Shonka, DB Loebel, AS Ogle, MC Johnson, ML Howard, EB Oak Ridge National Laboratory, Energy Research and Development Administration 1977, 354 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

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CONS/7405-1

16 175036

**TRANSPORTATION ENERGY CONSERVATION DATA BOOK: A SELECTED, ANNOTATED BIBLIOGRAPHY. EDITION 2**

The 568 references in this bibliography reflect the continuing effort to compile information on energy conservation in the transportation field. The citations refer to both specific statistical information and general background coverage and were selected to be used in conjunction with the report "Transportation Energy Conservation Data Book." All references are abstracted and arranged alphabetically by author or corporate author if there is no personal author. In addition, a separate list of reports sponsored by the Energy Research and Development Administration, Division of Transportation Energy Conservation is included; indexes are provided by author, corporate author, sponsor, report number, keyword, and permuted title. (ERA citation 03:008579)

Part II of ORNL--5320.

Howard, EB Barber, BY Jordan, AC Seaborn, CC Oak Ridge National Laboratory, Energy Research and Development Administration Oct. 1977, 261 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

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ORNL/EIS-114

16 175425

**FUEL AND ENERGY PRICE FORECASTS: QUANTITIES AND LONG-TERM MARGINAL PRICES. FINAL REPORT. VOLUME I**

SRI International (formerly Stanford Research Institute) prepared forecasts of long-term marginal fuel and energy prices over the period 1985 to 2000. These projections are shown in constant 1975 dollars on a regional basis for the United States. The major sources of energy analyzed are coal, uranium, crude oil, "syncrude" (produced from coal or oil shale), petroleum products, natural gas, and energy system, e.g., from the point of production through consumption. Prices of delivered fuels are presented for four sectors: electric

power generation, residential/commercial, industrial, and transportation. Because all fuels in the energy system are interrelated the emphasis in the study was to specify these relationships and to forecast prices (and quantities) at every level of the energy system. This was done within the framework of the SRI National Energy Model that explicitly models primary energy production and conversion, transportation and distribution, and end-use conversion. (ERA citation 03:010560)

SRI International 169 pp

ACKNOWLEDGMENT: NTIS

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EPRI-EA-433(V.1)

#### 16 175663

#### ENERGY DEMAND FORECASTING MODEL, TECHNICAL APPENDIX. COMPUTER PROGRAM USERS GUIDE AND OPERATING MANUAL, DATA BASE USERS GUIDE, AND PACIFIC NORTHWEST ENERGY DATA BASE

This document contains operating instructions and system documentation for a computerized energy demand forecasting model. The model has the capability to forecast energy demand for four fuel types (electricity, gas, oil, and coal), for the three Northwest states (Washington, Oregon, and Idaho), in five-year steps, from 1980 through the year 2000. The forecasts are further broken down into the Residential, Commercial, Industrial, Transportation, and 'Other' sectors. The model is written in Fortran for the CDC 6500 computer. The model is econometric, correlating over 800 time series. The document also contains a Pacific Northwest Energy Data base plus a Data Base Users Guide.

Prepared by Mathematical Sciences Northwest, Inc., Bellevue, Wash. Sponsored in part by Pacific Northwest Regional Commission, Vancouver, Wash. See also PB-274 336.

McHugh, WM Storie, JM Lockett, JW Scott, SG Holt, EA  
Northwest Energy Policy Project, Mathematical Sciences Northwest,  
Incorporated, Pacific Northwest Regional Commission Final Rpt.  
NEPP-II, 1977, 370 pp

ACKNOWLEDGMENT: NTIS

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PB-276921/4ST

#### 16 175725

#### TRANSPORTATION ENERGY CONSERVATION DATA BOOK: EDITION 2

Separate abstracts are prepared for the six main chapters on the various characteristics of the transportation sector. Chapter 7 provides the compilation of reference materials, and additionally, sections are devoted to a glossary, keyword index, and permuted-title index. (ERA citation 03:015114)

Shonka, DB Loebl, AS Patterson, PD

Oak Ridge National Laboratory, Department of Energy Oct. 1977, 567 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

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ORNL-5320

#### 16 176702

#### ENERGY SOURCES OF THE FUTURE

This review of future energy sources traces energy consumption patterns in the United States to the year 1990. In evaluation of the latest energy technologies, the author states that the era of cheap fossil fuel is over and attempts to project future energy needs on the basis of population growth and energy consumption rate per capita. An extrapolation of these needs minus the amount of fossil fuel that can be obtained or imported shows clearly the demand placed on domestic supplies. After an allowance is made for the remaining fossil reserves plus optimistic projections for energy from geothermal, hydroelectric, oil shale, and solar sources a deficit remains. It appears that nuclear fission energy is the only developed source that has a possibility of filling this deficit between the present and the year 2000. Beyond that date, there is hope that nuclear fusion energy or some other of the developing technologies will be available to supply the need.

Energy Sources for the Future Symp, Proc, Oak Ridge Assoc Univ, Tenn, July 5-23, 1976.

Sanders, JP

Oak Ridge Associated Universities Proceeding CONF-760744, 1977, pp 37-51

ACKNOWLEDGMENT: EI

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#### 16 176703

#### ENERGY SOURCES FOR THE FUTURE

This conference contains eighteen papers which present a variety of technical problems of the future. Particular emphasis is placed on nuclear reactor technology, safety, environmental impacts, and economics. The prospects for solar energy, coal, and thermonuclear reactors are also discussed. Socio-political as well as socio-economic aspects of future energy sources are considered on both a domestic and a global scale. Selected papers are indexed separately.

Energy Sources for the Future, Symp, Proc, Oak Ridge Assoc Univ, Tenn, July 5-23, 1976.

Duggan, JL (North Texas State University); Cloutier, RJ

Oak Ridge Associated Universities Proceeding CONF-760744, 1977, 425 pp

ACKNOWLEDGMENT: EI

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#### 16 176707

#### SELECTIVE BIBLIOGRAPHY "ENERGY AND TRANSPORT"--1974-1977-- [Bibliographie selective "Energie et transport"--1974-1977--]

No Abstract. [French]

International Union of Railways, BD Jan. 1978, 70 pp, 128 Ref., 6 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France

#### 16 176715

#### TRANSPORT FUELS FOR THE POST-OIL ERA

The fact that natural oil supplies are not limitless is now widely appreciated, but the debate continues as to what the most likely alternatives might be. This debate applies particularly to transport fuels, since transport is almost totally dependent on oil for its supply of fuel.

Charlesworth, G Baker, TM *Energy Policy* Vol. 6 No. 1, Mar. 1978, pp 21-35

ACKNOWLEDGMENT: Energy Policy

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#### 16 176874

#### ENERGY AND TRANSPORTATION

This forum considered the transportation needs for various forms of energy and the long-term availability of such energy sources. Papers dealing with the transportation energy needs of our nation covered passenger cars, heavy-duty trucks, aircraft, and other forms of transportation. Economic consideration and investment requirements associated with reducing our energy needs were discussed. The availability of energy as petroleum and in alternate forms was considered. Some attention was also directed toward alternate strategies which might alleviate our dependence upon petroleum. Again, investment requirements to meet our future energy needs were covered in considerable detail.

Papers from Energy and Transportation Forum; Detroit, Michigan, October 15, 1975.

Society of Automotive Engineers Conf Paper CONF-7510179, 1976, 99 pp

ACKNOWLEDGMENT: Energy Research Abstracts

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#### 16 176875

#### ENERGY CONSUMPTION IN THE TRANSPORTATION SECTOR

Energy consumption in the transportation sector accounted for 30 percent of the total gross energy input to the U.S. economy in 1975. In mid-1976, petroleum accounted for more than 95 percent of the energy input to the transportation sector, and this dominance by petroleum is also expected to continue well into the future. The consumption of petroleum products by the

transportation sector has shown some variation over time. There are six major products--liquefied gases, jet fuel, lubes and waxes, gasoline, distillate fuel, and residual fuel. Their percentage distribution over time is also documented in tabular form. Regional variations in transportation energy consumption are also documented.

Eff of Energy Constraints on Transp Syst, Proc of the 3rd Natl Conf, Union College, Schenectady, New York, August 2-6, 1976.

Dupree, WG (Bureau of Mines)

Energy Research and Development Administration CONF-760895, May 1977, pp 19-37

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Energy Research and Development Administration, 20 Massachusetts Avenue, NW, Washington, D.C., 20545

16 176877

#### TOTAL DIRECT AND INDIRECT COSTS OF BART

This paper deals with the direct and indirect energy costs of BART system. These costs are categorized amongst: traction, station maintenance, construction, and impact energy. Energy Intensity comparison is made for several Electric Transit Systems (Philadelphia, Chicago, New York, Cleveland, Toronto). Major emphasis of the paper is upon the indirect energy cost (construction energy) which is nearly 50 percent of the overall energy utilized for the BART system. For a comprehensive energy comparison of a given transportation system, it is important to identify not only the operational energy but also the construction energy. The author also makes a note regarding the unavailability of good data for fair comparisons.

Eff of Energy Constraints on Transp Syst, Proc of the 3rd Natl Conf, Union College, Schenectady, New York, August 2-6, 1976.

Healy, TJ (Santa Clara University)

Energy Research and Development Administration CONF-760895, May 1977, pp 207-222

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Energy Research and Development Administration, 20 Massachusetts Avenue, NW, Washington, D.C., 20590

16 176881

#### OVERVIEW OF THE POTENTIAL FOR ENERGY CONSERVATION FOR INTERCITY TRUCK AND RAIL OPERATIONS

The characteristics of intercity truck-and rail-freight modal operations were investigated to evaluate the potential for achieving energy savings. Intercity truck and rail freight operations were analyzed to determine the relationships between energy consumption and the delivery of transport service. The energy consumption impact of alternative conservation measures was calculated and, in turn, evaluated in light of a series of institutional constraints. As such, this study goes beyond the characteristic cataloging of alternative energy conservation measures by conducting a disaggregated assessment of the effectiveness and feasibility of implementing such measures. It is concluded that the potential for achieving energy conservation in the movement of intercity freight by truck and rail systems is limited, as well as shrouded by the complexity of the nature of the commodity itself, the commodity flow characteristics, and the market and institutional structure.

From International conference on energy use management, Tucson, Arizona, October 24, 1977; Vol. 1.

Bevilacqua, OM (Purdue University)

Pergamon Press 1977, pp 649-657

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

16 176882

#### MODE SHIFT STRATEGIES TO EFFECT ENERGY SAVINGS IN INTERCITY TRANSPORTATION

Increased fuel costs and growing concern over energy consumption and energy conservation have not, to date, changed the demand for U.S. transportation modes. Thus, short of changing life styles or developing an expanded willingness to use our communications systems as an alternative to travel, it will not be easy to alter the growth of travel demand, its distribution among the modes, or the consumption of energy by the transportation system. The FEA did, however, examine the potential for lessening the amount of energy devoted to transportation. The major goals

in this study are to determine the extent to which intercity travelers could be induced to shift from highly energy-consuming to more-energy-efficient travel modes, and to identify means of inducing such mode shifts which could save significant amounts of energy. The analysis was restricted to short-haul transport of intercity travelers in two high-density areas--the Northeast and California corridors. A major concern was the reaction of the traveling public to qualitative transportation system changes. The following fuel-conservation strategies were studied: air-fare adjustments; rail-fare reductions; rail- and busfare reductions; auto-cost increases; rail-block-time reductions; rail and bus block-time reductions; car availability; air frequency reductions; and combinations of the above. The study concludes with an examination of issues that could constrain or hamper implementation of the most attractive strategies found.

Aerospace Corporation Final Rpt. Apr. 1977, 296 pp

ACKNOWLEDGMENT: Energy Research Abstracts

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16 176920

#### POLICY ON ENERGY FOR TRANSPORTATION

The paper discusses guidelines for the development of a policy for transportation designed to satisfy a future society. Present day forms of transportation relying on an exhaustible source of energy must ultimately come to a halt. With forecasts of world oil production declining after about the year 2000, an alternative energy source is necessary with hydro-or nuclear-produced electricity an obvious choice. This would allow dwindling oil stocks to be used by petrochemical industries and air transport until converted to other forms of energy. The paper sets out guidelines for phasing out transportation by petrol-and oil-burning engines and the development of intra-city and inter-city forms of public transport.

Gamage, P *Chartered Institute of Transport Journal* Analytic Vol. 38 No. 2, Jan. 1978, pp 43-44

ACKNOWLEDGMENT: TRRL (IRRD-231775)

ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

16 179134

#### BUS, TRAIN, CAR OR PLANE--WHICH IS BEST?

Which means of transportation is the most energy efficient for a trip from Duluth to the Twin Cities?

Hielman, C *DOT Scene* Vol. 3 No. 5, May 1978, p 8

ACKNOWLEDGMENT: Minnesota Department of Transportation

ORDER FROM: Minnesota Department of Transportation, Transportation Building, John Ireland Boulevard, St Paul, Minnesota, 55155

DOTL

16 179151

#### SIMULATION STUDIES OF ENERGY SAVING WITH CHOPPER CONTROL ON THE JUBILEE LINE

Describes energy-consumption studies undertaken for the operation of rapid-transit services on London Transport's new Jubilee line.

Mellitt, B *Institution of Electrical Engineers, Proceedings* Vol. 125 No. 4, Apr. 1978, pp 304-310, 9 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

16 179521

#### HYDROCARBON FUELS

This book is concerned with the production, properties and performance of hydrocarbon fuels, both liquids and gases. The subject matter is treated under the following chapter headings:-(1) hydrocarbons as a source of energy. (2) structure and properties of hydrocarbon molecules. (3) thermo-chemistry of fuels. (4) fuel combustion equilibria. (5) basic properties and tests of liquid fuels. (6) additional properties and tests. (7) fuel-processing, and product applications. (8) fuel handling. (9) fuel performance in reciprocating-piston engines. (10) fuel performance in continuous combustions. (11) emissions from hydrocarbon fuel utilisation. (12) alternative fuels and direct conversion. Details of representative hydrocarbon properties are appended, together with typical commercial fuel specifications.

Goodger, EM

Macmillan Press, Limited 1975, V18 N27, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 227811)

ORDER FROM: Macmillan Press, Limited, 4 Little Essex Street, London  
WC2R 3LF, England

**16 179526**

**DEPLOYMENT OF NATIONAL RESOURCES IN THE  
PROVISION OF ENERGY IN THE UNITED KINGDOM,  
1975-2025, RELATING TO THE ACORD DISCUSSION  
DOCUMENT-ENERGY RESEARCH AND DEVELOPMENT IN  
THE UNITED KINGDOM**

The second report of the Watt Committee on energy presents results of the work undertaken by the working party on deployment of national resources. The working party has costed a number of scenarios, discussed in the acord discussion document, in relation to capital investment required, manpower and materials required, and land use. Its purpose is to examine the constraints on future energy policy caused by predicted resource limitations and to assist in the formulation of an energy policy.

Institution of Mechanical Engineers Report N2, Aug. 1977, 60 pp, 24 Fig., 35 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 231911)

ORDER FROM: Institution of Mechanical Engineers, 1 Birdcage Walk,  
Westminster, London SW1H 9JJ, England

P7803080

17 053277

**ORE COLLOQUIUM. REPORT ON THE SEVENTH ORE COLLOQUIUM "TECHNICAL COMPUTER PROGRAMS"**

No Abstract.

Restrictions on the use of this document are contained in the explanatory material. Preceding reports were presented as Question AZ 40. Prepared for Meeting in Dresden, East Germany, September 26-28, 1978.

International Union of Railways 1978, n.p.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

17 168130

**DATA DISPLAY TECHNIQUES FOR TRANSPORTATION ANALYSIS AND PLANNING: AN INVESTIGATION OF THREE COMPUTER-PRODUCED GRAPHICS**

Graphics are a powerful but often costly means of communication. Computer-drawn graphics offer a new and relatively inexpensive way to assist the communication of complex technical information to both planners and non-technical people whose full potential is now beginning to be realized. This paper discusses the utility of graphics and introduces three computer-drawn graphic techniques which may be useful, both for analysis and presentation of results, in the transportation planning process. Cenvue(s) produces a three-dimensional, perspective-view map, on which virtually any type of transportation data or performance indicator can be displayed. Vap is designed to display origin-destination travel patterns in any region. Tdn transforms a physical-distance network into a time-distance network so that effects of different speeds in the transportation network can be readily seen. The cost-effectiveness of each technique is briefly discussed and some recommendations for evaluating computer graphics techniques are provided to aid the user in further assessing their utility in the transportation planning process. /Author/TRRL/

Noguchi, T Schneider, JB (Washington University, Seattle) *Transportation Planning and Technology* Vol. 4 No. 1, Sept. 1977, pp 23-26, 13 Fig., 13 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 229048)

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DOTL JC

17 169128

**NETWORK FLOWS (A BIBLIOGRAPHY WITH ABSTRACTS)**

The bibliography cites research on the practical and theoretical applications of network flows to problem solving. Studies on job sequencing, transportation models, insurance, water resources, communication systems, data processing, waste disposal, and circuit analysis are included. (This updated bibliography contains 279 abstracts, 51 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0788, NTIS/PS-75/694, and NTIS/PS-75/065.

Grooms, DW

National Technical Information Service Oct. 1977, 284 pp

ACKNOWLEDGMENT: NTIS

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NTIS/PS-77/0891/OST

17 169228

**A NATIONAL NETWORK DATA BASE SYSTEM**

The report documents a data base 'system' created at the National Bureau of Standards. The National Network Data Base System (NNDBS) provides information on flows of freight and passengers throughout the transportation system of the United States. It consists of a set of Fortran programs written for the NBS Univac 1108 (but transportable) and some basic data tapes. In addition to providing basic data on the transportation network, the NNDBS can produce modal splits, aggregations over certain 'zones' in the U.S., and is capable of easy extension to other uses. The report is intended as a user's guide and includes discussions of the data tapes and each of the programs. Complete listings and tape formats are also included.

Supported in part by the Office of the Secretary of Transportation, Washington, D.C., and the Office of the Chief of Engineers (Army), Washington, D.C.

Jackson, RHF

National Bureau of Standards, Office of the Secretary of Transportation, Department of the Army, (NBS-2050405/6) Final Rpt. NBSIR-75-911, Sept. 1975, 61 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274629/5ST

17 169278

**MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM FUNCTIONAL REQUIREMENTS**

This report describes the design and planned operation of the Missouri Pacific car scheduling system. The design is based on a car scheduling prototype effort. The car scheduling programs actually implemented may vary somewhat from this design as user requirements and system limitations are more fully defined in detailed functional specifications.

Missouri Pacific Railroad Company, Federal Railroad Administration  
Final Rpt. FRA/OPPD-77/10, July 1977, 149 pp

Contract DOT-FR-65139

ACKNOWLEDGMENT: NTIS

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PB-2754239/8ST, DOTL NTIS

17 169300

**UTILIZING GEOGRAPHIC BASEFILES FOR TRANSPORTATION ANALYSES: A NETWORK BASEFILE SYSTEM**

The existence of geographic base files (GBF) for most large urban areas offers a significant resource for the network models required for many transportation studies. The thrust of the Network Basefile System (NETBASIS) development, underway at the University of Washington since 1974, is to build upon the existing GBF data resource (which has been operational for the city of Seattle for many years) and to provide a general purpose transportation network data base together with the required data manipulation and display software. The purpose of this paper is to present a status report on the NETBASIS development as of June 1977.

Gehner, CD

Washington University, Seattle, Urban Mass Transportation Administration  
Res Rpt. UMTA-WA-11-0005-78-1, RR-77-3, June 1977, 46 pp

ACKNOWLEDGMENT: NTIS

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PB-275586/6ST

17 170943

**AN ADVANCED TECHNIQUE BASED ON THE AUTOMATED MANAGEMENT SYSTEM [Progressivnaja tehnologija na osnove ASU]**

The automated management system will be employed in Rostov-Tovarnyj freight yard for the control of container transport. The introduction of this system will enable container transport planning, calculations and accountability to be automated. [Russian]

Minkin, II Kol'cickij, KZ *Zhelezнодорожные Transport* No. 10, 1977, pp 73-75, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novo-Basmanaya  
Ulitsa 2, Moscow B-174, USSR

17 172002

**SJ DEVELOPS A NEW LOCOMOTIVE DISPATCHING SYSTEM [SJ utvecklar ett nytt lokledningssystem]**

SJ is developing an information system for locomotive dispatching with the assistance of a computer. It is expected to be in operation in 1978. The locomotive dispatching will be concentrated at a control center in Stockholm and will in the first place be responsible for about 700 main line locomotives. It will also be responsible for the distribution and recording of the service of all locally assigned vehicles. In all, the system will include 2000 tractive units and railcars. A later extension of the system is intended to include also the allocation of about 2000 passenger coaches. A short description of the system is given.

Sundstroem, L *Nordisk Jaernbane Tidskrift* Vol. 103 No. 4, Aug. 1977, pp 14-16, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Nordiska Jaernvaegsmannasallskapet, SJ Centralfoervaltning, S-105 50 Stockholm C, Sweden

17 172660

**THE MOBILE INSTRUCTION SYSTEM USED AT AUXILIARY STATIONS FOR MASCHEN MARSHALLING YARD IN DATA ANNOUNCING [Das mobile Lehrsystem fuer die zum Rangierbahnhof Maschen gehoerenden Vorneldebahnhoefe]**

Organisation of the Maschen marshalling yard involves a massive data-processing system. 325 employees at 25 auxiliary stations take part in these operations, using 120 terminals. These employees undergo on-the-spot training by means of a specially converted bus; the equipment of this bus and the training programme are described in detail. [German]

Gellekum, R. Mueller, J. *Signal und Draht* Vol. 69 No. 10, Oct. 1977, pp 236-243, 11 Fig., 1 Tab., 2 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

17 172939

**SHINKANSEN VEHICLE ROSTERING SYSTEM**

Shinkansen vehicles are in principle operated in multiple units and they are also inspected on a multiple unit basis. The multiple units are handled on a one-day basis and the daily services of these units are based on the fundamental plan of services formulated on the occasion of timetable revision, with some allowance for the operation of special trains. To get maximum utilization of the rolling stock, computerized control of vehicles has been introduced. This article explains how this computerized control system improves the efficiency of the operations.

Hirota, Y (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 11-12, 1 Fig.

ACKNOWLEDGMENT: Japanese Railway Engineering

ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

17 173184

**COMPARISON OF THE USEFULNESS OF TWO MULTIREGIONAL ECONOMIC MODELS IN EVALUATING TRANSPORTATION POLICIES**

This report describes and compares two large-scale economic-forecasting models--the multiregional input-output model developed by Polenske and the multiregional, multi-industry forecasting model developed by Harris--to examine their usefulness for transportation planning at national, state and local levels. The models use fundamentally different methods of economic forecasting, and thus have different appropriate applications. Both the Polenske and the Harris models are currently used in analyzing regional economic activity by industrial sectors. A basic difference is that the Polenske model is used mainly for analyzing the effects of changes in interindustry trade flows between regions, whereas the Harris model is used mainly in forecasting regional growth and evaluating effects of alternative highway and other transportation systems. The Polenske model provides a framework for describing and analyzing the sales and purchases of all industries in every region of the economy and has been used to analyze the role of trade in the economic growth of particular regions, such as the California-Oregon-Washington region, as compared to the rest of the United States. The Harris model is designed to make both short-run and long-run forecasts of economic growth. Because it provides a frame-work for analyzing interindustry purchases, it has been used to evaluate the regional economic and environmental effects of alternative highway systems. /Author/

This article appeared in Transportation Research Record No. 634, Predicting and Measuring Impacts of Transportation Systems.

Coulter, HT (Federal Highway Administration) *Transportation Research Record* No. 634, 1977, pp 20-26, 2 Fig., 1 Tab., 16 Ref.

ORDER FROM: TRB Publications Off

17 173578

**UNAVAILABILITY AND FAILURE INTENSITY OF COMPONENTS**

A comprehensive and standardized set of equations to calculate component unavailability and component failure intensity has been obtained in the case of the repair and inspection policies which are usually not in practice. Some of the processes describing the component behavior can be classified under the heading of so-called "closed chain renewal processes" which are

described in the paper. In addition a general theory for the inspected components has been developed.

Caldarola, L. *Nuclear Engineering and Design* Vol. 44 No. 1, Oct. 1977, pp 147-162, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

17 173587

**CONRAIL'S ATTEMPTS TO IMPROVE ITS USE OF FREIGHT CARS**

Improved utilization of its freight cars is crucial to the profitability of Conrail as planned by the U.S. Railway Association. Conrail's car utilization in early 1977 was actually worse than that of its six bankrupt predecessors five years earlier. A car control system projected to be in place in 1979 will not be fully operational until 1982, but most of the other improvements called for in USRA's plans are being met. Repairs will be necessary for 90,000 cars instead of the planned 67,000 and 8,700 new cars will have to be acquired instead of an estimated 2,700. Conrail says it needs added funding to become self-sustaining and it will not proceed with the new control system until it is assured that added funds are available.

General Accounting Office Cong Rpt. CED-78-23, Jan. 1978, 31 pp, 1 Phot., 2 App.

ACKNOWLEDGMENT: General Accounting Office, NTIS

ORDER FROM: General Accounting Office, Distribution Section, Room 4522, 441 G Street, NW, Washington, D.C., 20548 NTIS PB-276104/7ST, DOTL RP

17 173600

**THE ASYMPTOTIC EXPONENTIAL FAILURE LAW FOR GENERAL REDUNDANT REPAIRABLE SYSTEM AND ITS APPLICATIONS**

The asymptotic exponential failure law for an arbitrary redundant repairable system is quite generally established by decreasing the unit unavailabilities to 0, without assuming, among other things, the exponentiality of life/repair distributions of the units. Using this fact, the system reliability can easily be approximated well by the exponential function, even if the unit unavailabilities are of small but positive values. The error of this approximation is successfully evaluated. Moreover, the asymptotic system repair-time distribution is also derived. The usefulness of these results is exemplified by several numerical examples and by practical reliability evaluation of a major subsystem of MARS 105, JNR's computerized seat reservation system.

Abe, S Ariyama, K. *Railway Technical Research Inst, Quarterly Reports* Vol. 18 No. 3, Rpt No. 1003-76, Sept. 1977, pp 125-128, 2 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

17 174194

**DETERMINATION, BY MEANS OF COMPUTER, OF TURNS OF DUTY IN AN URBAN PUBLIC TRANSPORT UNDERTAKING [La determinazione, mediante elaboratore, dei turni de servizio in un'azienda di trasporto pubblico urbano]**

An exposition is given of a procedure, studied within the Study Service of A.T.A.C., Rome, which, using the techniques of programming with complete numbers of operational research, has made it possible to decide the turns of duty of traveling personnel of a transport undertaking, given the timings of the lines. Indication is given of the additional ties to the algorithms of Garfinkel and Nemhauser used for the solution of the problem, for the reduction of calculation times; furthermore a simple application is given of this procedure to a real case. [Italian]

Cherici, A Picione, C. *Ingegneria Ferroviaria* No. 7-8, July 1977, pp 589-594

ACKNOWLEDGMENT: EI

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DOTL JC

17 174616

**STANDARD CODES FOR NAMED POPULATED PLACES AND RELATED ENTITIES OF THE STATES OF THE UNITED STATES (IN MICROFICHE)**

Included are standard codes for named populated cities, towns, villages, whether incorporated or unincorporated, important military and naval installations, townships, Indian reservations, named places that form parts of other places, places important for transportation, industrial, or commercial purposes, i.e., unpopulated railroad points, airports, and shopping centers. The standard code is seven characters in length, the first two of which identify the State. The last five numeric characters identify the place within the State and provide an alphabetic ordering of the place names. In addition to the place name and its code, the list also provides the name and code for the county (or counties) in which the place is located, the ZIP Code of the servicing post office (or offices) cross-references to former or alternate names, an inclusion code, a class designator code, and a cross-reference to the Worldwide Geographic Location Code issued by the General Services Administration.

For data file on magnetic tape, see PB-274150. Material available in 35 sheets. Microfiche is at 48X reduction. Price includes paper copy of the 'User Information for Standard Place Code Data File'.

McEwen, HE

National Bureau of Standards Final Rpt. NBS-DF-77/009a, Nov. 1977

ACKNOWLEDGMENT: NTIS

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PB-274146/OST

17 174618

**STANDARD CODES FOR NAMED POPULATED PLACES AND RELATED ENTITIES OF THE STATES OF THE UNITED STATES**

The Standard Codes for Named Populated Places and Related Entities of the states of the United States include codes for named populated cities, towns, villages, and similar communities, whether or not incorporated, and several categories of named entities that are similar to these in one or more important respects. In addition to incorporated and unincorporated named populated cities, towns, and villages, this standard provides codes for scattered rural communities; important military and naval installations; townships in the states where such units have governmental powers; Indian reservations, national and state parks, named places that form parts of other places as defined; and named places with no permanent residents, but important for transportation, industrial, or commercial purposes, such as unpopulated railroad points, airports, and shopping centers. The standard code for places is seven characters in length, the first two characters of which identify the state (using the standard state code or abbreviation). The last five numeric characters identify the place within the state and provide an alphabetic ordering of the place names. In addition to the place name and its standard code, the list also provides the name and standard code for the county (or counties) in which the place is located, the postal ZIP code of the servicing post office (or offices), cross-references to former or alternative names, an inclusion code, a class designator code, and a cross-reference to the Worldwide Geographic Location Code issued by the Office of Finance of the General Services Administration.

Source tape is in ASCII character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products, if you have questions. Price includes User's Guide, PB-274 151.

McEwen, HE White, HS

National Bureau of Standards Data File NBS/DF-77/009b, Jan. 1977, n.p.

ACKNOWLEDGMENT: NTIS

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PB-274150/2ST

17 174619

**STANDARD CODES FOR NAMED POPULATED PLACES AND RELATED ENTITIES OF THE STATES OF THE UNITED STATES; USER'S GUIDE**

Included are standard codes for named populated cities, towns, villages, whether incorporated or unincorporated, important military and naval installations, townships, Indian reservations, named places that form parts of other places, places important for transportation, industrial, or commercial

purposes, i.e., unpopulated railroad points, airports, and shopping centers. The standard code is seven characters in length, the first two of which identify the State. The last five numeric characters identify the place within the state and provide an alphabetic ordering of the place names. In addition to the place name and its code, the list also provides the name and code for the county (or counties) in which the place is located, the ZIP Code of the servicing post office (or offices) cross-references to former or alternate names, an inclusion code, a class designator code, and a cross-reference to the Worldwide Geographic Location Code issued by the General Services Administration.

For data file on magnetic tape, see PB-274 150.

McEwen, HE

National Bureau of Standards NBS/DF-77/009c, Nov. 1977, 19 pp

ACKNOWLEDGMENT: NTIS

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PB-274151/OST

17 175267

**FREIGHT CAR DEMAND INFORMATION AND FORECASTING RESEARCH PROJECT. PHASE II**

Freight car demand information and forecasting systems have become increasingly important to the centralized car distribution procedures that have developed in the railroad industry. During Phase II, a forecasting system was developed which incorporated the recommended features from Phase I (report dated March 1975). The objective of Phase II was to test the accuracy of the recommended system in practice and to determine the feasibility of implementation. Several conclusions were reached, including: (1) Car order information, field forecasts, and loadings information can be obtained and a forecasting system developed at a relatively low cost. (2) The resulting forecasting system can forecast a composite measure of demand at an 80 to 95 percent accuracy rate on a week-to-week basis. This report documents these conclusions and others and presents the results of the various forecasting approaches developed.

See also Phase I, PB-261 473.

Minger, WK Hargrove, MB

Association of American Railroads Technical Center, Federal Railroad Administration Final Rpt. FRA-OPPD-77/5, Nov. 1977, 82 pp

Contract DOT-FR-30058

ACKNOWLEDGMENT: NTIS

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17 175390

**QUEUEING NETWORKS IN HEAVY TRAFFIC**

The principle purpose of this report is to state and prove a limit theorem which justifies a diffusion approximation for general queueing networks. The K-dimensional vector queue length process is investigated for the network. Because of the general form assumed for the interarrival and service distributions, the process has no special structure such as the Markov property. In this generality, the network has proven to be intractable, hence the desire for an approximation. It is possible to define a traffic intensity for each station in the network. Heavy traffic is said to hold when all stations have traffic intensities close to unity. Mathematically, heavy traffic is interpreted through consideration of a sequence of queueing networks indexed (say) by n, each with its own parameters, defined in such a way that the traffic intensity of each station approaches unity as n approaches infinity. The state space of the limit process is the K-dimensional non-negative orthant. On the interior of its state space the process behaves as a multidimensional Brownian motion with an easily computed drift vector and covariance matrix. At each boundary surface the process reflects instantaneously. The directions of reflection are given by a simple expression involving only the routing matrix. After proving that the limit process is a diffusion, its generator is computed, justifying the above description.

Reiman, MI

Stanford University Tech Rpt. TR-76, Sept. 1977, 106 pp

Grant

ACKNOWLEDGMENT: NTIS

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17 175412

**DATA CHARACTERIZATION AND COMPRESSION**

The extraction of information from measured or computed data is all-pervasive; to gain the most value from extracted information, it must often be transformed from one type of data into another, a process that can only preserve or lose information. An information-transformation process based upon Prony's method was found to be increasingly useful for application to electromagnetic-type problems in particular and a growing variety of physical problems in general. This procedure allows the coefficients and exponents (or parameters) of an exponential series to be derived from a sequence of its sampled values. Two basic issues are associated with Prony processing: determination of the status of the input data and application of the procedure as effectively as possible to maximize the information content of the output. The possible uses of the Prony method as an information-on-transportation process are discussed; the insight gained from this viewpoint concerning the information content of data is emphasized. Waveform and spectrum characterization, data compression, and inversion of pattern data are considered briefly as applications. (ERA citation 03:011178)

Miller, EK

California University, Livermore, Energy Research and Development Administration July 1977, 24 pp, 8 Fig., 3 Tab.

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS

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17 175654

**AN EVALUATION OF CODING METHODOLOGIES FOR  
POTENTIAL USE IN THE ALABAMA RESOURCE  
INFORMATION SYSTEM (ARIS)-TRANSPORTATION STUDY  
FOR THE STATE OF ALABAMA**

Procedures developed for digitizing the transportation arteries, airports, and dock facilities of Alabama and placing them in a computerized format compatible with the Alabama Resource Information System are described. The time required to digitize by the following methods: (a) manual, (b) Telereadex 29 with film reading and digitizing system, and (c) digitizing tablets was evaluated. A method for digitizing and storing information from the U. T. M. grid cell base which was compatible with the system was developed and tested. The highways, navigable waterways, railroads, airports, and docks in the study area were digitized and the data stored. The manual method of digitizing was shown to be best for small amounts of data, while the graphic input from the digitizing tablets would be the best approach for entering the large amounts of data required for an entire state.

Montgomery, OL

Alabama A&amp;M University NASA-CR-150480, Dec. 1977, 35 pp

Contract NGR-01-001-023

ACKNOWLEDGMENT: NTIS

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N78-15948/OST

17 175939

**TRANSPORTATION PLANNING: NETWORK MODELS AND  
THEIR IMPLEMENTATION**

Transportation planning plays an essential role in shaping regional and urban lifestyle. Complex decisions regarding policy alternatives for railroads, shipping, airline, and roadway traffic can often be, and often have been, analyzed using network optimization techniques. In this paper, the authors survey applications of network algorithms to transportation planning, stressing networks models and their efficient computer implementation. They discuss recent contributions concerning shortest paths, minimum cost network flows, traffic equilibrium, vehicle routing, and network design, and they enumerate several open research problems. Much of the discussion reflects an emerging theme in the analysis of transportation problems, the blending of ideas from transportation science, computer science, and operations research. (Author)

Contract N00014-75-C-0556, DOT-TSC-1058.

Magnanti, TL Golden, BL

Massachusetts Institute of Technology Tech Rpt. TR-143, Jan. 1978, 59 pp

ACKNOWLEDGMENT: NTIS

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AD-A050652/7ST

17 176461

**PROPENSITIES TO SHIP MANUFACTURES BY RAIL WITHIN  
FOUR U.S. TRAFFIC FLOWS (ABRIDGMENT)**

The use of a freight transportation service at two levels of geographic aggregation, represented by nonoverlapping component traffic flows and the aggregate that combines them, is modeled. The basic aim is estimators of demand parameters. Propensity is used to denote the nonrandom part of the actual percentage of goods shipped via the specified service. The general approach is by three hypotheses: The first states that the expected value of use in the aggregate is a weighted average of expected use in the components. The second states that the expected use in each component equals expected aggregate use plus a constant. The third states that all of the random variables describing service use have the same form whether aggregate or component. An illustrative study of rail shipments by manufacturers using four component traffic flows is included. It is noted that greater commodity detail and the inclusion of at least a relative price are required for a conclusive empirical study.

This article appeared in the Transportation Research Record No. 637, Forecasting Passenger and Freight Travel.

Stone, TA *Transportation Research Record* No. 637, 1977, p 62

ORDER FROM: TRB Publications Off

DOTL JC

17 176672

**AN AUTOMATED CONTROL SYSTEM FOR THE USSR  
RAILWAYS**

The article gives a detailed description of problems encountered in the creation of a unified automated network control for the USSR railways and some of the stages completed. The need for a large-scale system and modern computers is emphasized. The economic results are quite favourable.

Koulayev, KV *Rail International* Vol. 9 No. 2, Feb. 1978, pp 76-82

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

17 176680

**COMPILATION OF SERVICE ROSTERS AS PART OF  
PLANNING FOR RAILWAY INSTALLATIONS  
[Dienstplangestaltung als Teil der Fertigungsablaufplanung von  
Eisenbahnunternehmen]**

The models used to date for drawing up service rosters and stock schedules were based on very specific network characteristics. Description of a new model that can be used with a computer. It consists of a main program and eleven sub-programs. Comparisons between this model and previous manual methods have given satisfactory results especially for control and use of train crews. [German]

Lenke, H *Glaser's Annalen ZEV* Vol. 101 No. 11, 1977, pp 459-464, 4 Ref., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

17 176686

**STORED TIMETABLE DATA DRIVES PLATFORM INDICATORS**

British Rail has taken an ambitious step forward in the use of computers to compare stored timetable data with actual movements of trains.

*Railway Gazette International* Vol. 134 No. 2, Feb. 1978, pp 65-66, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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17 176906

**CENTRALIZED MANAGEMENT OF FREIGHT TRAFFIC AT  
SNCF [La gestion centralisee du trafic des marchandises a la S.N.C.F.]**  
The Freight Traffic Centralized Management (FTCM) of the SNCF (French National Railway) is an information service dedicated to facilitating the solution of the complex and interconnected problems connected with the transportation of freight by railway. The service has at its disposal a network



of computers and terminals with which information on the location of a given railway car with a freight load is processed. The operation of this data network is described on the example of a hypothetical freight car as it goes through its rotation cycle from one expeditor to the next. [French]

Grenet, MF (French National Railways) *Sciences et Techniques* Feb. 1978, pp 29-34

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris 9e, France

17 177203

#### MATHEMATICAL MODELLING-THE ERROR OF OUR WAYS

The main sources of error throughout the mathematical modelling process are identified and the accuracy of output from each stage is evaluated using a combination of theoretical and empirical approaches. Errors in forecasting input parameters and the use of calibration adjustments are both considered briefly. The significance of the accuracy of various outputs is discussed in detail. It is concluded that output is inadequate for most design purposes and that evaluative techniques are so sensitive to small modelling errors that little reliability can be attached to even comparative studies. Because modelling results create an illusion of accuracy and objectivity, they are frequently used to justify proposals in whose formulation modelling has played little part. Arguments are advanced for the more discriminating use of modelling in transport studies and for more emphasis on data collection as a direct aid to decision-making. /TRRL/

Robbins, J (East Sussex County Council, England) *Traffic Engineering and Control* Vol. 19 No. 1, Jan. 1978, pp 32-35, 1 Tab., 8 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231818)

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17 178148

#### ON THE USE OF TREE-INDEXING METHODS IN TRANSPORTATION ALGORITHMS

The paper describes how to use the triple index and the threaded index for storing the basis-tree when applying the primal, dual or primal-dual simplex algorithm to solve a classical transportation model. The experience reported in the references suggests that the algorithms thus obtained are among the most efficient today. Detailed algorithms are given in order to facilitate computer-implementation.

Jacobsen, SK (Royal Technical University of Denmark) *European Journal of Operational Research* Vol. 2 No. 1, Jan. 1978, pp 54-65, 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

17 178435

#### PRESENT POSITION AS REGARDS THE AUTOMATION AND INFORMATION CONCEPT [Stand der Arbeiten zur Konzeption fuer Automation und Information]

The DB Board decided in 1975 to initiate an in-depth study into automation and information problems. Where automation is concerned, it was a matter of seeking, for the various branches of the undertaking, future possibilities for application of automation. In the case of information, priority was given to the development of computer-based information, documentation, and planning systems. The article describes the procedure adopted, the objectives fixed for the continuation of studies. [German]

Schenk, O *Die Bundesbahn* Vol. 54 No. 1, 1978, pp 9-13, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

17 178449

#### MICROPROCESSORS: A DISCUSSION IN THE CONTEXT OF TRANSPORT CONTROL

Analyses the most important aspects of microprocessors. Their relationship to other current control technology such as hardwired logic and minicomputers is explained in the first section; their applications, manufacturing considerations and important advantages are also discussed.

Evans, JB *Traffic Engineering and Control* Vol. 19 No. 3, Mar. 1978, pp 112-115, 3 Figs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

17 178487

#### ANALYTICAL STUDY OF THE COMPUTER AIDED CONTROL SYSTEM FOR THE SHINKANSEN: AN ACTUAL BEHAVIOR

A computer-aided Traffic Control System (COMTRAC) is adopted with a view to operating the great many trains on the Shinkansen smoothly, precisely and in great safety. A study was carried out to analyze and assess this complex, man-machine system by a new method named CDPA (Man-Machine Communication & Decision-making Process Analysis Diagram), which the authors have devised, and OSD (Operational Sequence diagram). As a result of the study, the behavior of the system was divided into several groups by the amount of related information. The study has also revealed that the limited value of the communicating capacity could be found out by analyzing the amount of information, given and received during the time of train diagram confusion.

Proc of 16th IEEE Conference Decis Control Incl Symp Adapt Processes and a Special Symposium on Fuzzy Set Theory and Appl, New Orleans, Louisiana, December 7-9, 1977.

Iiyama, Y (Railway Labour Scientific Research Inst, Japan);

Yamauchi, K Yanagawa, K

Institute of Electrical and Electronics Engineers Conf Paper 77CH1269-OCS, 1977, 6 pp

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

17 179067

#### TRANSPORTATION NETWORKS

Three network models used in transportation system analysis are described. These are: a) the traffic assignment model which routes traffic through a congested network according to one of two optimization schemes, b) an optimal network improvement model which improves link so as to minimize total travel time within a fixed investment budget, c) a model which optimizes network improvements over time. Solution techniques, which include decomposition and nonlinear programming algorithms, are discussed.

Proceedings of the 16th IEEE Conf Decis Control Incl Symp Adapt Processes and Spec Symp on Fuzzy Set Theory and Appl, New Orleans, Louisiana, December 7-9, 1977.

Roberts, EJ (Transportation Systems Center)

Institute of Electrical and Electronics Engineers Conf Paper n 77CH1269-OCS, 1977, pp 639-644, 30 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

17 179068

#### IMPROVED LINEAR APPROXIMATION ALGORITHM FOR THE NETWORK EQUILIBRIUM (PACKET SWITCHING) PROBLEM

A method is presented for accelerating the convergence of the algorithm based on the Frank and Wolfe linear approximation method for the convex cost multicommodity flow problem known as the "equilibrium traffic assignment problem" in transportation networks and as the "optimal routing of packet switched messages" in communication networks. The acceleration of the convergence of this algorithm is achieved with a nontrivial adaptation of Wolfe's suggestion of an "away" step in the linear approximation method and a variant of this adaptation based on restriction.

Proceedings of the 16th IEEE Conf Decis Control Incl Symp Adapt Processes and a Spec Symp on Fuzzy Set Theory and Appl, New Orleans, Louisiana, December 7-9, 1977.

Florian, M (Montreal University, Canada)

Institute of Electrical and Electronics Engineers Conf Paper n 77CH1269-OCS, 1977, pp 812-818, 23 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: IEEE

17 179110

#### INTERIM REPORT, INTERMODAL MANAGEMENT INFORMATION SYSTEM--PHASE II. TASK II

This report documents the results of the two major Phase II tasks: (1) a state-of-the-art survey including a literature review to determine the extent

to which systems that directly support intermodal services have been developed; and (2) a review and evaluation of the functional and technical characteristics of an IMIS general design. Results from each task were synthesized to form a baseline system recommendation that concentrates on three critical areas for initial IMIS development: (1) an intermodal equipment control system; (2) an intermodal repetitive waybilling and rating system; and (3) an intermodal profit analysis system. The cost-benefit analysis of the proposed fully-operational system shows the recommended baseline system is not only feasible, but desirable, and would provide long-term cost savings. Additionally, the report addresses utilization of a data base management system (not recommended), and use of a minicomputer programmed in a high-level language (recommended). A high degree of isolation from host teleprocessing and data bases is required to develop an IMIS which can interface with a majority of existing railroad systems.

Prepared in cooperation with R. Short, R. Holland and J. Robertson of the Norfolk and Western Railway.

Paternick, J Fredrickson, V Heisey, M Pflugrad, A Rynders, B Rudwick, B  
PRC Systems Sciences Company Intrm Rpt. FRA/OPPD-78/12, Apr. 1978, 96 pp, 16 Fig.

Contract DOT-FR-741-5157

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-282287/AS, DOTL RP

#### 17 179111

#### STATE-OF-THE-ART SURVEY FOR INTERMODAL MANAGEMENT INFORMATION SYSTEM--PHASE II. TASK I

Survey objectives were: (1) to determine the state of existing and planned systems which support any or all aspects of intermodal activity; and (2) to identify unmet needs. A sample of eight railroads was surveyed in detail. In addition, one common carrier, two trucking subsidiaries, and one international water carrier were included to further diversify the investigation of intermodal activities. Findings of the survey were verified by a search of pertinent literature and related research. All railroads, other than the

smallest, presently have some type of automated systems supporting intermodal management and control. These vary widely in sophistication, in the degree to which mechanized processing is employed, and in the extent to which intermodal processing is embedded in existing rail systems. The use of data processing techniques for the intermodal carrier has been, in large part, an outgrowth of automated systems developed for carload traffic and does not take into consideration the unique nature of intermodal traffic (e.g., the need to keep an inventory of two pieces of equipment rather than one). Survey participants indicated that increased capabilities are needed in the following areas: an intermodal equipment control system, a repetitive waybilling and rating system, a profit analysis system.

Prepared in cooperation with G. Sargent and S. Kendrick of Ford, Bacon & Davis, Inc., and R. Short, R. Holland and J. Robertson of the Norfolk and Western Railway for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development.

Paternick, J Fredrickson, V Pflugrad, A Rynders, B Wiersema, R  
PRC Systems Sciences Company FRA/OPPD-78/8, Mar. 1978, 171 pp, 5 App.

Contract DOT-FR-741-5157

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-281016/AS, DOTL RP

#### 17 179141

#### ELECTRONIC DATA PROCESSING [Vycislitel'naja tehnika]

This brochure describes the centralized freight traffic management system used for operating purposes. The system is directed to the problems of planning combined rail-sea traffic. The brochure also explains the main features of the programs for establishing the technical operating specifications for the network and services provided, and gives particulars on the introduction of the first phase of the system. [Russian]

Skoblikov, VG TsNIITEI Vol. 1 No. 45, 1978, 33 pp, 3 Fig., Tabs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: TsNIITEI, Raushskaia Nab 4, Moscow 113035, USSR

18 169655

**CHANGES NEEDED IN PROCEDURES FOR SETTING FREIGHT-CAR RENTAL RATES**

The per-diem rental rate one railroad pays another for using its freight cars is set by the Interstate Commerce Commission. The Commission revised its rules, regulations, and practices for freight-car per diem in August 1977. The Commission should go further by: Discontinuing the higher incentive-per-diem rates paid for plain boxcars; Amending its regulations to allow incentive-per-diem funds currently being held to be spent for purposes that promote sound car-service practices, including the efficient utilization and distribution of cars.

General Accounting Office CED-77-138, Nov. 1977, 45 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273550/4ST

18 170581

**COMPARATIVE COAL TRANSPORTATION COSTS: AN ECONOMIC AND ENGINEERING ANALYSIS OF TRUCK, BELT, RAIL, BARGE AND COAL SLURRY AND PNEUMATIC PIPELINES. VOLUME 5--CONVEYOR BELTS**

Costing of coal transport by conveyor belt, for a range of tonnages and distances, is based on an heuristic model of an optimal system for each case. Cost factors are industry based. The model and format are open to provide user manipulation. A specific case is presented as an example.

Set includes PB-274 379--PB-274 386. See also RRIS 18 170577, the first volume in RRIS bulletin 7801.

Rieber, M Soo, SL  
Illinois University, Urbana Aug. 1977, 60 pp, 6 Fig.

Contract JO166163

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274383/AS

18 170583

**COMPARATIVE COAL TRANSPORTATION COSTS: AN ECONOMIC AND ENGINEERING COST ANALYSIS OF TRUCK, BELT, RAIL, BARGE AND COAL SLURRY AND PNEUMATIC PIPELINES. VOLUME 7--PNEUMATIC TRANSPORT**

Based on past and current studies, a theoretical analysis of a coal carrying pneumatic pipeline is presented including friction factors, minimum transport velocity, and pipeline telescoping. A 3.5-mile, 200-tph, pilot facility is designed. Cost analyses are presented. These and the design are extrapolated to a 100-mile line, smaller coal sizes and greater throughput.

Set includes PB-274 379--PB-274 386. Also see RRIS 18 170577, the first volume in RRIS bulletin 7801.

Rieber, M Soo, SL  
Illinois University, Urbana Aug. 1977, 78 pp, 19 Fig.

Contract JO166163

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274385/AS

18 172020

**TOWARD EQUITABLE GENERAL RATE INCREASES**

A provision of the 4R Act relative to rate making places new emphasis on return on investment and capital generation in formulating rate increases. This paper suggests a means by which ICC can use data generated by its one-percent waybill sample aggregated by commodity and territorial movement to make rate increases equitable in terms of the current contribution of particular commodity movements relative to others. The criteria for an equitable burden distribution is the movements' present revenue to variable cost ratio. A formula is given for this application.

Tosterud, RJ (Upper Great Plains Transportation Institute) *ICC Practitioners' Journal* Vol. 45 No. 2, Jan. 1978, pp 195-198

ACKNOWLEDGMENT: ICC Practitioners' Journal

ORDER FROM: Association of Interstate Commerce Comm Pract, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

18 172523

**ANALYSIS OF ECONOMIC COSTS AND EXPENSES IN ROAD AND RAIL TRANSPORT**

This report compares and contrasts the cost concept which is relevant to the economic analysis of transport with that of the traditional cost analysis. In order to avoid the confusion of using the same word in two senses, the concept put forward here is called "economic cost" while the traditional one is called "expenses". It is the first of these two which is relevant to the efficient allocation of resources. In Chapter 1 the nature of economic cost is set out and it is shown why this is different from expenses. This chapter is concerned with principles and explains them without using the technical language of economics. Chapter 2 critically examines in some detail the traditional type of analysis of expenses. It shows how and why the application of such analysis very often produces results which diverge considerably from the true economic cost of particular traffic movements. Finally, Chapter 3 examines the implications of the economic principles of an approach yielding better insights into the economic costs of traffic movements. /TRRL/

Turvey, R

Commission of the European Communities Monograph No. 4, 1976, 36 pp

ACKNOWLEDGMENT: TRRL (IRRD-228665)

ORDER FROM: European Community Information Service, 2100 M Street, N.W. Suite 707, Washington, D.C., 20037

P779204, DOTL RP

18 172631

**DEFERRED MAINTENANCE: A PROFIT MAXIMIZING APPROACH**

A definition of deferred maintenance to maximize profits is developed in terms of train weights and speed. From these optimum values the rate of track deterioration can be determined and expenditures required to restore track to some previous level fixed. The methods should allow railroads to determine where they may be over-expending on track, as well as setting maintenance priorities. The analysis will help identify unprofitable track which the railroad may want to abandon.

Bausch, JA Hooven, RR (Union Pacific Railroad) *Transportation Journal* Vol. 17 No. 2, Dec. 1977, pp 60-64, 4 Fig.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

18 172668

**OPTIMAL DECISION RULE FOR REPAIR VS REPLACEMENT**

This paper presents a policy for either repairing or replacing a system that has failed. The policy applies to systems whose mean residual life function is decreasing. An optimal policy is developed that minimizes the cost per unit time for repair and replacement. Results are shown graphically for a particular distribution of time to failure and are motivated in terms of an automobile replacement problem.

Muth, EJ (Florida University, Gainesville) *IEEE Transactions on Reliability* Vol. R-26 No. 3, Aug. 1977, pp 179-181

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

18 173567

**ROLE OF ECONOMIC ANALYSIS IN PLAN SELECTION**

The planning and processing requirements for major transportation projects have undergone significant changes in the past two decades. The need to consider environmental, social, and land-use impact in addition to economic issues and the necessity of incorporating citizen inputs has resulted in the development of new methodologies capable of accommodating these concerns. There is still a need for sound economic analysis of alternatives to assist in defining the consequences of alternative plans. The evolution of economic analysis in the planning process is reviewed, followed by a description of available economic analysis techniques and an examination of the function of economic analysis in the plan selection process. Proper selection and application of economic analysis techniques can provide valuable information to assist the decision maker to select among alternative transportation investment alternatives.

Herendeen, JH, Jr (Gannett, Fleming, Corrdry & Carpenter, Inc.) *ASCE Journal of Transportation Engineering* Vol. 104 No. 1, Jan. 1978, pp 55-67

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 18 174195

##### INVESTMENT PLANNING STUDY MODEL (IPS)

This computer program will determine the financial impact for alternative investment and capital improvement programs, for various car utilization assumptions and for other efficiency assumptions. Use of IPS is directly related to development of Conrail's 5-Year Business Plan. In its present form it employs APL\*Plus and Quick Plan available from Scientific Time Sharing.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 18 174196

##### FINANCIAL PLANNING MODEL (FPM)

This computer program produces long-range financial statements based on budget inputs. It will perform analyses based on inflation rate sensitivity, rate increase sensitivity and interest rate sensitivity. The program is being expanded to incorporate volume variabilities and sensitivity to efficiency. FPM uses USRA-developed APL Data Organization Techniques (APL-DOT).

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 18 174199

##### CAR COST ANALYSIS PROGRAM

This computer program determines the costs of using a foreign, leased or repaired system car and determines the impact on the income statement of using leased car alternatives.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 18 174204

##### RSPO SUBSIDY PROGRAM

This computer program calculates the Light Density Line subsidy level under the Rail Service Planning Office requirements given alternative service characteristics and traffic/revenue bases. The program as written by RSPO has been revised and enhanced.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 18 174205

##### ECONOMIC LIMIT OF REPAIR PROGRAM

This computer program determines the economic limit of repair of system cars beyond which replacement is preferable. The program uses standard economic principles utilized elsewhere to determine freight car life. The program makes calculations for the entire car fleet and includes lease encumbrances.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 18 174210

##### FLEET MANAGEMENT SYSTEM

The computer program will provide an up-to-date inventory of the company's automotive fleet, as well as a complete history of all expenses. This information will provide the means by which the operating and maintenance cost can be reduced to a minimum. The system will pinpoint abuses so corrective action can be taken and will provide a guide for authorizing repairs and vehicle replacement. All expenses over \$50 will require authorization by Fleet Management personnel.

Direct requests to Manager, Off-Line Systems, Missouri Pacific Railroad Company.

Missouri Pacific Railroad Company Mar. 1978, n.p.

ACKNOWLEDGMENT: Missouri Pacific Railroad  
ORDER FROM: Missouri Pacific Railroad Company, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri, 63103

#### 18 174213

##### CN CASH FLOW FORECASTING MODEL

This computer program is used to maintain the weekly and monthly corporate cash forecasts for about sixty items of receipts and disbursements. Through a set of commands, a cash management officer can display, update and consolidate the cash forecasts and generate the required amounts of borrowing or investment. It produces reports such as weekly and monthly cash forecasts, changes in cash positions, and comparisons of actual versus forecasted cash flows.

Direct requests to Manager, Operational Research, Canadian National Railways.

Canadian National Railways No Date, n.p.

ACKNOWLEDGMENT: Canadian National Railways  
ORDER FROM: Canadian National Railways, P.O. Box 8100, Montreal, Quebec H3C 3N4, Canada

#### 18 174218

##### CONSOLIDATED ACCOUNTS RECEIVABLE

A combined batch and online computer system was developed to consolidate three railroads' accounts into one system. The batch system accomplishes mechanical generation of billing statements, tracer letters and discrepancy notices, and automatic application of cash. In addition, control work and management reports are produced. This online system allows general inquiry into the status of Customer Accounts, Cash Application, Bill Account Transfers, and Bill Corrections and Adjustments.

Direct requests to Special Projects Manager, Revenue Accounting, Illinois Central Gulf Railroad.

Illinois Central Gulf Railroad Mar. 1978, n.p.

ACKNOWLEDGMENT: Illinois Central Gulf Railroad  
ORDER FROM: Illinois Central Gulf Railroad, 233 North Michigan Avenue, Chicago, Illinois, 60601

#### 18 174219

##### CAR HIRE ALLOCATION

A computer system is allocating ICG Car Hire Expenses to responsibility centers. These responsibility centers consist of specific terminals, trainmaster territories and repair facilities, as well as general categories of Car Distribution and Marketing. The system collects reports of operational events, creates pairs (e.g., Arrival-Departure), assigns responsibility to each pair and calculates the associated Car Hire Expense.

Direct requests to Manager, Terminal Standards, Illinois Central Gulf Railroad.

Illinois Central Gulf Railroad Mar. 1978, n.p.

ACKNOWLEDGMENT: Illinois Central Gulf Railroad  
ORDER FROM: Illinois Central Gulf Railroad, 233 North Michigan Avenue, Chicago, Illinois, 60601

#### 18 174349

##### STUDIES IN THE ECONOMICS OF FEDERAL TRANSPORTATION POLICY #2. ECONOMETRIC ESTIMATION OF COST FUNCTIONS IN THE TRANSPORTATION INDUSTRIES

The validity of econometric estimates of the costs of the various transportation modes remains an issue surrounded by controversy. While there have been numerous econometric studies of rail, trucking and airline costs, no one

has yet developed a costing methodology that has yielded results that are generally accepted as valid. This inability to obtain a consensus concerning costing methodology and/or the validity of empirical results arises not so much from a lack of effort, but rather from the failure to specify the cost functions that appropriately characterize the structure of technology. Specifically, there appears to be three fundamental problems that one must address in specifying and estimating cost functions for the transportation industries. First, the output of a transportation firm, whatever the mode, is multidimensional by its very nature. Consequently, the mix of output can have a major impact upon the costs of any given firm. Second, it is generally agreed that the activities of each of the transportation modes are characterized by joint and common costs, implying that their technology is characterized by joint production. Third, to the extent that regulatory or other constraints prevent the firms in each mode from making optimal adjustments in capacity, they are not generally in a position of long-run equilibrium operating along their long-run cost function. Consequently, efforts to estimate long-run cost functions directly from cross-sectional data will yield seriously biased coefficients and resulting measures of marginal costs. This paper reports on a general methodology using a translog cost function that meets the objections raised with respect to most cost functions: it permits multiple outputs and quality levels; it is of a sufficiently flexible form to test hypotheses concerning the underlying structure of production; and it can be used in either its short-run or long-run form.

Research supported by the Department of Transportation, Office of University Research.

Spady, R. Friedlaender, AF  
Massachusetts Institute of Technology CTS-76-13, Sept. 1976, 98 pp, 2 Fig., 38 Ref., 2 App.

Grant DOT-OS-50239

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

18 174354

#### A COMPARISON OF FREIGHT TRANSPORTATION CARRIER COSTS AND RATES CHARGED

Much speculation has centered on how freight rates compare to the carriers' cost of providing service. This report describes a study of the issue which utilizes models developed by Morlock and Warner to approximate the ICC's cost tables and models developed by the author to approximate freight rates. Graphs are presented comparing carrier cost and rates for a variety of distances, shipment sizes, and commodities for rail carload, truck, and trailer-on-flatcar modes. The results suggest some hypotheses about the profitability of different types of traffic.

Prepared for U.S. Department of Transportation, Office of University Research, Analysis of Freight Markets.

Samuelson, RD  
Massachusetts Institute of Technology CTS-77-2, Feb. 1977, 23 pp, 11 Fig., 3 Ref., 1 App.

Contract DOT-OS-50112

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

18 174357

#### MODELING THE FREIGHT RATE STRUCTURE

While an understanding of the freight rate structure is necessary to an understanding of the freight transportation industry, remarkably little has been known about the subject. The primary difficulty in studying the tariffs of regulated carriers is the complex and voluminous nature of these tariffs. Data on unregulated carrier tariffs are largely unavailable. This report describes the specification and estimation of a set of tariff models using disaggregated data from waybills. The models are functions of the attributes of the shipment, and are thus, "commodity abstract" and origin-destination abstract. This technique makes possible the estimation of the elasticity of rate with respect to the attributes of a shipment, prediction of rates for use in freight planning, an estimation of the prediction errors, and intermodal comparisons of tariff structures. Rate relationships for the various modes which may be inferred from the models are discussed. Guidelines are suggested for using tariff models in freight demand studies.

Samuelson, RD  
Massachusetts Institute of Technology CTS-77-7, Feb. 1977, 144 pp, 27 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

18 174364

#### WHAT ARE REASONABLE UNIT TRAIN COAL TARIFFS: AN ATTORNEY'S PERSPECTIVE

The history of freight rate regulation in the case of captive traffic is discussed in the light of legislation from 1887 to 1976. The author urges that rates on unit train coal movements be fixed at a level which will both cover the variable costs of providing the service and make a fair contribution towards constant costs and a reasonable profit.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Clark, JR  
PLM, Incorporated Conf Paper 1977, pp 195-200

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

18 174394

#### EVALUATION OF CAPITAL BUDGETING PORTFOLIO MODELS USING SIMULATED DATA

The effectiveness of six approaches to capital budgeting under uncertainty is evaluated. The standard of comparison was a second-degree stochastic dominance model. The research environment consisted of ten hypothetical capital budgeting projects and an existing asset base. Variations in project demand, competitive actions, and technological changes were simulated by changing the shapes of the cash flow distributions. The required net present value distributions were obtained through a simulation and state of the economy methodology. Results of the study indicated that the models were sensitive to the characteristics of the cash flow distributions and that financial managers must exercise considerable care in their selection of a capital budgeting decision model. The mean-semivariance model yielded the most consistent results while decisions based upon the traditional net present value model were incorrect much of the time.

Bey, RP (Missouri University, Columbia); Porter, RB *Engineering Economist* Vol. 23 No. 1, 1977, pp 41-65, 25 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

18 176463

#### APPROXIMATION EQUATIONS FOR COSTS OF RAIL, TRAILER-ON-FLATCAR, AND TRUCK INTERCITY FREIGHT SYSTEMS

This paper presents equations that approximate the fully allocated and variable costs contained in the Interstate Commerce Commission cost tables for rail-carload, trailer-on-flatcar, and truck intercity freight movements. These equations were developed to enable the user to approximate the costs quickly and easily. They should be useful in initial studies of costs where the exact values are not needed, such as in consideration of rate changes, studies of profitability, and general intermodal comparisons. The equations were used to develop estimates of cost for complete shipper to receiver shipments via the three carriers to illustrate general properties of the carriers, individually and with respect to one another. /Author/

This article appeared in the Transportation Research Record No. 637, Forecasting Passenger and Freight Travel.

Morlok, EK Warner, JA (Pennsylvania University, Philadelphia) *Transportation Research Record* No. 637, 1977, pp 71-77, 5 Fig., 2 Tab., 7 Ref.

ORDER FROM: TRB Publications Off

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18 176667

#### RAILROAD COST FORECASTING

An investigation into the forecasting of changes in railway costs is reported. This investigation is comprised of two stages. The first is a conceptual discussion of major factors influencing cost changes and the techniques for

forecasting such changes. The second stage involves the application of specific techniques to the prediction of four different basic cost series: diesel fuel, real average weekly earnings, "traffic" expenses, and "transportation" expenses. Both the Box-Jenkins methodology and deterministic curve fitting are utilized in this stage. An analysis of this work and an overall summary conclude the paper. A selected bibliography is included.

Daub, M  
Canadian Institute of Guided Ground Transport Final Rpt.  
CIGGT-77-8, Apr. 1977, 32 pp, 5 Fig., 5 Tab., 4 App.

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

18 176674

**SYSTEMATIC APPROACH AND LIMITS OF TRANSPORT INVESTMENT FROM THE EVALUATION STANDPOINT**  
[Systematisierung und Abgrenzung von Verkehrsinvestitionen unter Evaluierungsaspekten]

The bases to date for estimating investments in the transport sector are unsatisfactory. No proper account is taken of outside influences which should be taken into consideration for the different types of investment. Description of the characteristics of transport investments showing the difficulty of establishing a model which allows for all the direct and indirect repercussions of these outside effects. [German]

Laschet, W Witte, H *Internationales Verkehrswesen* No. 5, 1977, pp 291-295

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

18 176716

**SHORT RUN COST FUNCTIONS FOR CLASS II RAILROADS**

Paper seeks to determine the short-run responsiveness of total costs and various categories of costs to changes in traffic density (that is, net ton miles per mile of road), and thus the short-run cost functions, of a sample of ten Class II railroads for the period 1963-1973.

Charney, AH Sidhu, ND Due, JF *Logistics and Transportation Review*  
Vol. 13 No. 4, 1977, pp 345-359

ACKNOWLEDGMENT: Logistics and Transportation Review  
ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

18 176869

**CLASSIFICATION OF COMPOUND INTEREST MODELS IN ECONOMIC ANALYSIS**

An analogous multiple-classification taxonomy of compound interest models is proposed. It embraces separate descriptive classifications of cash flow, interest rate, and planning horizon. This classification is intended to be encyclopedic, that is, capable of including all such models extant and yet to be developed. It should prove useful to academicians with respect to structuring classroom presentations and identifying researchable areas. It should also be of value to practitioners of engineering economy in the selection of appropriate discounting models.

Fleischer, GA (University of Southern California); Ward, TL *Engineering Economist* Vol. 23 No. 1, 1977, pp 1-12, 21 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Texas University, Dallas, P.O. Box 688, Richardson, Texas, 75080

DOTL JC

18 179128

**ESTIMATING COST FUNCTIONS FOR RAIL RAPID TRANSIT PROPERTIES**

Using data from North American rail transit properties, short and long run cost functions are estimated using a neoclassical economic model. Various special econometric techniques are employed to estimate the relationships from a heterogeneous data set. The estimated cost functions are then used to forecast the cost experience of the BART system in San Francisco.

Pozdena, RJ Merewitz, L *Transportation Research* Vol. 12 No. 2, Apr. 1978, pp 73-78, Refs.

ACKNOWLEDGMENT: Transportation Research  
ORDER FROM: ESL

DOTL JC

18 179133

**MARKETING RAILROAD EQUIPMENT TRUST CERTIFICATES**

Equipment trust certificates are a form of debt obligation frequently used by United States railroads to finance the purchase of rolling stock.

Hawks, DR Wood, DF *ICC Practitioners' Journal* Vol. 45 No. 4, May 1978, pp 466-478

ACKNOWLEDGMENT: Association Interstate Commerce Comm Practitioner  
ORDER FROM: Association Interstate Commerce Comm Practitioner, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

19 172619

**WROUGHT IRON BULL HEAD RAIL**

The author presents the results of test conducted on the material properties of the wrought-iron bull-head rail, which was used at the time when the Japanese Railways started its business (in 1872) and which was discovered during field work. The rail manufacturing technology in those early days is described through comparison of the test results with the quality and grade of the rails currently in use. [Japanese]

Kurihara, T (Railway Technical Research Laboratory) *The Heat Treatment* Vol. 15 No. 2, 1975, pp 102-107, 9 Fig., 2 Tab., 5 Ref.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Japan Heat Treatment Association, Tokyo, Japan

19 173410

**RAILROADS, TRUSS BRIDGES, AND THE RISE OF THE CIVIL ENGINEER**

This article reviews a few significant aspects of nineteenth century truss bridge design, and relates the influence of bridge failures to the development of the civil engineering profession.

Jackson, DC (National Tank Service) *ASCE Civil Engineering* Vol. 47 No. 10, Oct. 1977, pp 97-101

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

20 147535

**MARKET FOR RAILROAD CARS 1976-1985**

The railroad industry and its competition are reviewed in depth in the first four chapters dealing with economics of transportation. The final four chapters from which the forecast is made are: Commodity movements forecasts; Railroad traffic; Railcar Fleet; Manufacture of Railcars.

Planning and Forecasting Consultants Final Rpt. Dec. 1976

ORDER FROM: Planning and Forecasting Consultants, 863 Frostwood, Houston, Texas, 77024

20 166340

**MEXICAN WINTER VEGETABLE PRODUCTION MARKETING AND TRADE: AN OVERVIEW**

A report is made on important vegetable exports from Mexico to the U.S., with special attention to fresh vegetables during the U. S. winter season. Nogales is discussed as the chief point for U.S.-Mexican agricultural trade, and the state of Sinaloa as the primary production region for exporting. Producer organizations are described, along with U.S. competitive relationships, labor and wage relations, and technological aspects. Among the commodities handled are peppers, tomatoes, cucumbers, watermelons, and eggplant.

Andrew, CO

Florida University, Gainesville Economics-25, June 1975, 26 pp

ACKNOWLEDGMENT: NTIS

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PB-267890/2ST

20 166371

**COAL POLICY OR THE LACK THEREOF**

This report examines certain key policies that have affected the coal industry including proposed strip-mining legislation, air quality standards, restrictions on coal slurry pipelines, and coal land leasing rules.

McCullough, DL

George Washington University, National Science Foundation Final Rpt. NSF/PRA-7501111/13/6, Mar. 1976, 46 pp

Grant NSF-OEP75-01111

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-268360/5ST

20 168651

**SOLID WASTE DISPOSAL ECONOMICS (A BIBLIOGRAPHY WITH ABSTRACTS) [Rept. for 1964-Sep 77]**

The topics cited in the bibliography include all aspects of the economics of solid waste disposal and abatement, covering studies concerning industries, transportation, urban planning, and recycling. Topics such as profitability of waste recovery and the economics of using new solid waste processing and disposal techniques and their impact on handling costs are included. (This updated bibliography contains 227 abstracts, 102 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0661, NTIS/PS-75/536 and NTIS/PS-74/092.

Cavagnaro, DM

National Technical Information Service Sept. 1977, 232 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-77/0790/4ST

20 168978

**MODAL TRAFFIC IMPACTS OF WATERWAY USER CHARGES**

No abstract available.

Set includes PB-273 883 thru PB-273 885.

Transportation Systems Center 3 volumes, Aug. 1977, 745 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273882-SET/ST

20 168979

**MODAL TRAFFIC IMPACTS OF WATERWAY USER CHARGES. VOLUME I: RECOVERY OPTIONS AND IMPACTS SUMMARY**

The report has considered waterway user charges, which have been proposed as a method of cost recovery of Federal expenditures. The report has

examined possible modal carrier and traffic impacts due to user charges on the inland river system, and potential differential effects of various cost recovery options. It has found that waterway ton-miles may be reduced by as much as ten percent by the recovery of 100 percent of annual Federal operating, maintenance, and rehabilitation expenditures on rivers through a segment-specific toll. Adjustments to the changes in transportation prices by economic agents such as shippers, carriers, and producers should act to lower these traffic impacts over the long term. The report is divided into three volumes. This volume serves as an introduction to and summary of the Department of Transportation inland waterway user charge analysis. Alternative recovery options are discussed, sample tolls are calculated, and potential impacts of cost recovery on waterway traffic and carrier finances are summarized.

See also Volume 2, PB-273884 and Volume 3, PB-273885; RRIS 20 168980 and 168981 respectively; RRIS Bulletin 7802. Also available in set of 3 reports PC E12, PB-273 882-SET.

Anderson, DL Schuessler, RW Cardellicchio, PA

Transportation Systems Center Final Rpt. DOT-TSC-OST-77-36-I, Aug. 1977, 158 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273883/9ST, DOTL NTIS

20 168980

**MODAL TRAFFIC IMPACTS OF WATERWAY USER CHARGES. VOLUME II: DISTRIBUTION SYSTEMS ANALYSIS**

The report has considered waterway user charges, which have been proposed as a method of cost recovery of Federal expenditures. The report has examined possible modal carrier and traffic impacts due to user charges on the inland river system, and potential differential effects of various cost recovery options. This volume describes the detailed analyses performed to determine the potential impacts of inland waterway cost recovery on waterway traffic and markets. Each chapter describes the distribution system for a particular commodity/industry group and estimates the impact of cost recovery tolls on barge traffic by evaluating potential changes in transportation mode, routing, materials' source, and production technologies.

See also Volume 1, PB-273883 and Volume 3, PB-273885, RRIS 20 168979 and 168981 respectively; RRIS Bulletin 7802. Also available in set of 3 reports PC E12, PB-273 882-SET.

Anderson, DL Schuessler, RW Cardellicchio, PA

Transportation Systems Center Final Rpt. DOT-TSC-OST-77-36-II, Aug. 1977, 371 pp

ACKNOWLEDGMENT: NTIS

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PB-273884/7ST, DOTL NTIS

20 168981

**MODAL TRAFFIC IMPACTS OF WATERWAY USER CHARGES. VOLUME III: DATA APPENDIX**

The report has considered waterway user charges, which have been proposed as a method of cost recovery of Federal expenditures. The report has examined possible modal carrier and traffic impacts due to user charges on the inland river system, and potential differential effects of various cost recovery options. This volume is a data appendix for the Department of Transportation's analyses of Federal cost recovery on the inland waterways. Tables include toll calculations by river and commodity, and ton-mile loadings for each river segment by commodity and river of origination. This allows determination of the interactions of river segments in each commodity class.

See also Volume 1, PB-273883 and Volume 2, PB-273884, RRIS 20 168979 and 168981 respectively; RRIS Bulletin 7802. Also available in set of 3 reports PC E12, PB-273 882-SET.

Anderson, DL Schuessler, RW Cardellicchio, PA

Transportation Systems Center Final Rpt. DOT-TSC-OST-77-36III, Aug. 1977, 216 pp

ACKNOWLEDGMENT: NTIS

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PB-273885/4ST, DOTL NTIS



20 169022

## NATIONAL COAL UTILIZATION ASSESSMENT. PROJECT PLAN, 1977-1979

The ERDA Assistant Administrator for Environment and Safety (AES) is sponsoring a project entitled the National Coal Utilization Assessment (NCUA). Contained in this plan is an identification of the principal users and uses of coal which represent the focus of the effort, a description of the requirements, strategies and methods of the project implementation, and its schedule of performance. (ERA citation 02:042407)

Energy Research and Development Administration Mar. 1977, 31 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

ERDA-77-19

20 169031

## OVERVIEW OF TRANSPORTATION IN THE NUCLEAR FUEL CYCLE

This document presents a review of current transportation regulations, a description of transportation systems currently in use, a discussion of systems that are anticipated to be developed in the future and a projection of shipments and shipping distances through the year 2000. (ERA citation 02:045141)

Rhoads, RE

Battelle Memorial Institute/Pacific Northwest Labs, Energy Research and Development Administration May 1977, 66 pp

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS

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BNWL-2066

20 169033

## CURRENT AND FUTURE USE OF COAL IN THE NORTHEAST

Some of the problems of and potential for coal utilization in the Northeast region (defined as New England, New York, Pennsylvania, New Jersey, Delaware, Maryland, and the District of Columbia) are discussed. Coal utilization in the Northeast now occurs mainly in Pennsylvania, where coal is used extensively for steel manufacturing and electricity generation. Elsewhere in the region, coal use is limited for the most part to electric power generation, and increased future reliance on coal is likely to be associated principally with this use. At present, oil supplies most of the energy used to generate electricity in the Northeast. Recent trends in national and regional coal use are reviewed, and an overview of potential options for and constraints on future coal use are presented. The outlook for future coal supplies in the region for the reference years 1985 and 2000 is discussed. Supply estimates are shown tabularly. Regional availability of low-sulfur coal will depend on interregional economic factors as well as on technical constraints and public policy. The transportation system of the Northeast coals also constrain coal use. The potential demand for coal by electric utilities in the region is considered. Three coal demand scenarios are developed for 1985. The role of coal-derived synthetic fuels in the energy future of the Northeast is discussed. For the most part, processes producing low-Btu gas, high-Btu gas, and synthetic liquids from coal will contribute to the energy supply of the Northeast indirectly by augmenting national supplies of gas, oil, and electricity. In 1985, synthetic fuels production is likely to be small; by 2000, more substantial contributions could be available if a national policy for rapid coal synthetics development was pursued. (ERA citation 02:042510)

Edelston, BS Rubin, ES

Brookhaven National Laboratory, Energy Research and Development Administration May 1976, 151 pp

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

BNL-50560

20 169486

## SURVEY OF ELECTRIC UTILITY DEMAND FOR WESTERN COAL

This report presents the results of a survey of electric utility demand for western coal. The sources of survey information are: (1) Federal Power Commission Form 423 data on utility coal purchases covering the period

July 1972 through June 1976 and (2) direct survey data on utility coal-purchase intentions for power plants to be constructed by 1985. Price and quantity data for western coal consumed in existing plants have been assembled and presented to illustrate price and market-share trends in individual consuming regions over recent years. Coal source, quality, and quantity data are presented for existing and planned generating plants. (ERA citation 02:053819)

Asbury, JG Kim, HR Kouvalis, A

Argonne National Laboratories, Energy Research and Development Administration Jan. 1977, 73 pp

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

ANL/SPG-1

20 169498

## PRICE AND AVAILABILITY OF WESTERN COAL IN THE MIDWESTERN MARKET

The prices of low-sulfur Western coals selling in the Midwestern market are estimated for the period 1975 to 1982. The price estimates follow from a cost analysis of Western coal production and transportation that takes into account possible constraints on the rate of Western coal development. Analysis of Western coal transportation costs reveals a wide variation in railroad transportation rates. Rates in 1975 for shipments from the Powder River Basin to destinations north of Chicago or west of the Mississippi River were approximately 7.4 mills per ton-mile; rates for destinations south of Chicago and east of the Mississippi were about 9.3 mills per ton-mile. Railroad transportation costs, expressed in constant dollars, are projected to increase at 3 percent per year. Information provided by this study should assist government regulatory bodies and electric utilities and industrial companies in evaluating alternative sulfur dioxide control strategies. (ERA citation 02:047347)

Industrial power conference, Memphis, Tennessee, United States of America (USA), 16 May 1976. Available from ERDA, P.O. Box 62, Oak Ridge, TN 37830, Attn: TIC.

Asbury, JG Costello, KW

Argonne National Laboratories, Energy Research and Development Administration 1976, 16 pp

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

CONF-7605145-1

20 169641

## MONTANA'S MAJOR ENERGY TRANSPORTATION SYSTEMS: CURRENT CONDITIONS AND FUTURE DEVELOPMENTS

This report discusses major energy transportation systems in Montana, future developments in Montana's coal-related transportation systems, and proposals to supply petroleum and natural gas to Montana.

Prepared by Polzin (Paul E.), Missoula, Mont.

Montana Energy Advisory Council, Polzin (Paul E) Dec. 1976, 111 pp

ACKNOWLEDGMENT: NTIS

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PB-273425/9ST

20 169650

## IMPLICATIONS OF A DOUBLING OF KENTUCKY COAL PRODUCTION FOR THE STATE ECONOMY

This study examines the nature and magnitude of benefits and cost that would occur in Kentucky economy if the output of coal in Kentucky would double in 8 to 10 years. The cost benefit analysis is conducted for three separate scenarios, each representing a different composition of demand for four categories of coal consumption: export; electric utilities; industry, commerce and household; and coal conversion to gas or liquid. The study includes the major impact on the coal mining industry, coal supportive industries, coal conversion, population, employment, local and state revenue, social infrastructure and cost related thereto, and the environment.

Prepared in cooperation with Kentucky Center for Energy Research, Lexington.

Hultman, CW Davis, B Ramsey, J Marsden, J

Kentucky University, Kentucky Center for Energy Research July 1977, 67 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-273493/7ST

20 169653

**ALASKA-CANADA TRANSCONTINENTAL RAIL CONNECTION TO CONTIGUOUS UNITED STATES. A REPORT TO THE GOVERNOR AND THE LEGISLATURE OF THE STATE OF ALASKA**

The report is the result of a \$50,000 appropriation by the State Legislature to the Department of Commerce and Economic Development to gather information regarding a rail link with the contiguous 48 states. The report concludes that the potential and need for the route appears to be substantial and recommends that the Canadian and U.S. governmental entities immediately undertake a joint cost-benefit analysis of the project. In support of these conclusions the report describes the possibility for over two million tons of Alaska and Yukon generated cargo alone that would be available to a through railroad by 1990. It is suggested that this freight will also be substantially augmented by transcontinental tonnage exchanges across Alaska from Alaskan ports once the connection is made.

Prepared in cooperation with Economic Development Administration, Washington, D.C.

Walt, RS

Alaska State Dept of Commerce & Economic Devel, Economic Development Administration Jan. 1977, 74 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-273532/2ST

20 169779

**PROCEDURES FOR MULTI-STATE MULTI-MODE ANALYSIS: FIRST YEAR'S RESEARCH**

The report presents an analytical procedure designed to measure quantitatively the interactions between economic development potential and transportation service improvements. The transportation services of interest include both existing and developmental modes and intermodal services. The analysis focuses on the Multi-State Corridor extending from Brunswick, Georgia to Kansas City. Significant results of the first year's research are: (1) Establishing variable-sized network zones; (2) identifying state highways, rail lines, and navigable inland waterways; (3) defining 53 industry/commodity groups, along with production coefficients for labor, energy, capital, and materials; (4) preparing a 111 zone, 53 commodity flow table for the U.S.; (5) calibration of mode split equations for seven industry/commodity groups; (6) developing and calibrating market share equations; (7) testing the overall procedure in four zones in Northern Mississippi. No developmental conclusions can be drawn from the limited test.

Prepared in cooperation with Alabama University, Huntsville, Auburn University, Alabama, and Memphis State University, Tennessee.

Jones, PS

Georgia Institute of Technology, Alabama University, Huntsville, Auburn University, Memphis State University, Department of Transportation Final Rpt. DOT/OS-60512-8, Dec. 1977, 259 pp

Contract DOT-OS-60512

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-276001/5ST, DOTL NTIS

20 170941

**RAIL FREIGHTING ON A NEW AND SPEEDY TRACK**

Carriage of bulk materials such as coal, ores, and other raw materials is, and probably always will be, the mainstay of any rail freighting system. Conversely, as rail executives candidly admit, for local distribution and door-to-door movements under 100 miles, the pragmatic solution is road hauling. It is the No-Mans-Land between these two areas that British Rail sees as its big opportunity for the expansion of its freight services.

*Freight Management* Vol. 11 No. 130, Nov. 1977, pp 16-21, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: IPC Transport Press

20 172021

**AGRICULTURAL COOPERATIVE TRUCKING AND TRANSPORT EFFICIENCY**

This article focuses on competition within trucking which is generally divided into a regulated segment and an unregulated segment primarily associated with transportation serving agriculture. The status and posture of the unregulated segment of trucking is described and the author contends that its suppression to protect regulated carriers violates economic principles of efficiency and contributes to cost inflation in all sectors of the economy. The efficiency problem is compounded by the rapidly growing role of trucking in agricultural marketing.

Roberts, MJ *ICC Practitioners' Journal* Vol. 45 No. 2, Jan. 1978, pp 157-174

ACKNOWLEDGMENT: ICC Practitioners' Journal

ORDER FROM: Association of Interstate Commerce Comm Pract, 1112 ICC Building, Washington, D.C., 20423

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20 172630

**MARKETING RAIL PIGGYBACK SERVICES**

This paper identifies 50 of the 80 commodity classes in the Census of Transportation as piggyback-potential traffic. The market is found to be 43.4 billion ton miles, none of which is presently moving by rail. The comparative ranking of regions and of railroads presently handling substantial piggyback traffic is discussed. Those lines with the greatest potential in this field are identified. For traffic to grow, the maintenance and equipment bottlenecks created by inadequate investment have to be removed.

Morash, EA (Maryland University, College Park); Hille, SJ (Alabama University, Tuscaloosa); Bruning, ER (Alabama Trucking Association) *Transportation Journal* Vol. 17 No. 2, Dec. 1977, pp 40-50, 4 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

20 173161

**INTEGRAL ALUMINUM INDUSTRY FOR THE SOUTHEAST--CONCERNS AND OUTLOOK**

Reserves of kaolin in Georgia are more than adequate to support an alumina or aluminum industry. The author gives economic estimates regarding a hydrochloric acid extraction method based on a million short tons a year production of alumina and concludes that a commercial alumina-from-kaolin facility in Georgia could be on stream between late 1980 and 1985.

Husted, JE (Georgia Institute of Technology) *Mining Congress Journal* Vol. 63 No. 9, Sept. 1977, pp 28-33

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 173583

**WHO WILL MOVE THE COAL?**

The conflict between coal slurry pipeline developers and railroads whose right-of-way the pipelines would cross is discussed. What is the railroads' rationale for blocking coal slurry pipeline progress when they routinely grant right-of-way to oil, gas, and water pipelines? Out of a multitude of arguments, it often boils down to one basic point--coal unit trains are the railroads' expansion vehicle. With slurry pipelines in the picture, the railroads claim, the "cream" of the coal hauling business would be lost forever, leaving the railroads saddled with massive amounts of unused track capacity. To add insult to injury, railroad calculations show the slurry pipelines are unnecessary in the first place. Doubling coal carrying capacity, railroads say, would require only 2% average growth per year, easily attainable at present levels of expansion. The Federal Energy Administration, however, estimates that even if six coal slurry pipelines are built (only four are being seriously considered), western railroads alone will haul an additional 200 million tons of coal by 1985. Such a boost, say slurry proponents, indicates that there is more than enough business to go around.

*Mining Engineering* Vol. 29 No. 10, Oct. 1977, pp 49-50

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 173584

## U.S. COAL EXPORTS: STILL HUGE, BUT DECLINING

The outlook for coal exports to the U.S.'s biggest markets: Japan, Canada and Europe, is discussed. In 1976, the U.S. continued to be the world's largest coal exporting country, selling abroad at least 10% of all coal mined in the U.S. Exports of coking coal are expected to increase over the next several years but the greatest opportunity for growth is seen in the steam coal market as the countries throughout the world turn to coal to replace imported oil for power generation.

Holmes, C (Coal Exporters of the United States, Incorporated) *Coal Mining and Processing* Vol. 14 No. 11, Nov. 1977, 4 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

20 174025

## THE RAILFREIGHT OFFENSIVE. 1: CHEMICALS

Details are given of the organization of British Rail's Railfreight operations and this article in particular covers those in the oil and chemicals field. These are two sharply contrasting industries. In oil the pattern is almost identical from one company to another: refineries by and large dispatch similar ranges of products to similar customers. However, in the chemical industry almost every firm is an individual case study, with distinctive processes, products and markets. Chemicals produce only 3% of BR's freight tonnage and 5% of Railfreight revenue, but the long term potential is thought to be good. Some examples of success by British Rail in the chemicals sector are briefly described.

Freeman, JH *Modern Railways Analytic* Vol. 34 No. 351, Dec. 1977, pp 472-475, 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 231385)

ORDER FROM: ESL

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20 174185

## POTASH

Potassium is one of three key chemical ingredients used to promote plant growth and increase crop yield per acre; the other two ingredients are nitrogen and phosphorous. Mixtures of the three are commonly sold as NPK fertilizers. Potassium aids in synthesis of starch and sugar, stiffens straw in cereal grains, promotes root growth, and enables the plant to better withstand adverse conditions of climate and disease. Soils that have been depleted of potash by cropping may be replenished by the addition of muriate of potash, KCL; for chloride-sensitive crops, a sulfate of potash, either potassium sulfate or potassium magnesium sulfate, is used. There is no substitute for potassium fertilizers. This Bureau of Mines report presents comprehensive data for the commodity including industry structure, reserves and resources, technology supply-demand relationships, by-products and coproducts, strategic considerations, economic factors and problems, operating factors and problems, and outlook for the future.

Singleton, RH

Bureau of Mines 1978, 27 pp, 3 Fig.

ACKNOWLEDGMENT: Bureau of Mines

ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 174187

## REQUIREMENTS OF SCRAP FOR STEELMAKING AND THE INCREASED USE OF SCRAP PROCESSING

Changes in steelmaking technology and market demands have influenced scrap requirements. The call for greater conservation of resources will necessitate the use of scrap grades hitherto considered unsuitable. Against this background the author evaluates the types of scrap available and the methods used for upgrading them.

Thornton, DS (British Steel Corporation) *Iron and Steel International* Vol. 50 No. 5, Oct. 1977, 5 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

20 174346

## DEVELOPMENT OF A POLICY SENSITIVE MODEL FOR FORECASTING FREIGHT DEMAND. PHASE ONE REPORT

Freight transport demand is a matter that has received less than its share of attention both in the theoretical literature and in actual practice. The

barriers to the development of appropriate freight transport demand forecasting techniques are developed and explained and methods for overcoming these barriers are suggested. The role of data both in the formulation and the use of the model is explained. Finally, a list of criteria for desirable features of a demand model are developed. Appendices present the specification of a model currently under development at MIT and a short review of the literature.

Prepared for Department of Transportation, Office of the Secretary.

Roberts, PO Ben-Akiva, M Terziev, MN Chiang, YS  
Massachusetts Institute of Technology CTS-77-11, Apr. 1977, 127 pp, Figs., 4 App.

Contract DOT-OS-70006

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

20 174347

## DESIGN OF A STRUCTURE AND DATA ANALYSIS SCHEME FOR INTERCITY FREIGHT DEMAND FORECASTING

The objective of this research effort is to detail the implications of using a disaggregate behavioral model to produce a design for a pilot program of data collection. The first step will be to review the literature on freight demand models with particular emphasis on previous research done using disaggregate demand models. A second step will be to review existing sources of data and sort them out as to their usability in a disaggregate model framework. The third step is to develop and evaluate different data collection strategies and recommend a data collection scheme which can be used economically to acquire the data needed to develop an intercity freight demand forecasting capability. Particular attention will be directed to the data collection already underway by the Bureau of the Census, Commodity Shipper Survey. The research contemplated here will also take into account recommendations by the U.S. Department of Transportation to expand the Census of Transportation.

Chung, CC Roberts, PO

Massachusetts Institute of Technology CTS-75-15, Sept. 1975, 154 pp, Figs., Tabs., 1 App.

Contract DOT-TSC-1005

ACKNOWLEDGMENT: Massachusetts Institute of Technology

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

20 174350

## ANALYSIS OF THE INCREMENTAL COST AND TRADE-OFFS BETWEEN ENERGY EFFICIENCY AND PHYSICAL DISTRIBUTION EFFECTIVENESS IN INTERCITY FREIGHT MARKETS

This report describes a study of the effects of changes in national transportation policy on the traffic allocation and the energy consumption of various modes of intercity freight transportation. The study focuses on the linkages between freight transportation and industry structure. Starting from the viewpoint of the individual firm, the process of ordering and shipping supplies has been analyzed in detail. Models have been developed to predict the level of service associated with the transport alternatives available to a firm, and to predict the total logistics cost of each of these alternatives. These models make it possible to forecast the demand for various modal services at the disaggregate level. In order to predict total aggregate demand, a method has been developed for sampling from the population of firms, and summing the demands. Using these models and methods, it is possible to make detailed forecasts of commodity flows under alternative policy options. The policy options selected for analysis include: substantial rehabilitation of railroad yards and facilities, improving TOFC-/COFC performance with shuttle trains, allowing unrestricted use of double trailers on the Interstate Highway System, increasing truck user charges, imposing waterway user charges, and an increase in fuel costs. The policies were investigated with a computerized model system which simulated freight flows between four pairs of major metropolitan areas. Before the model could be applied, each policy had to be analyzed with regard to its effect on the key level of service determinants: waiting and travel time distributions, loss and damage, and tariff rates. The model system has been used to predict the impact of these levels of service changes on the shipping patterns of a

sample of individual firms. These results have been summed and expanded to produce aggregate forecasts of modal shares and energy consumption.

The computer program developed for this project is described in User Manual for Freight Transportation Analysis Software, RRIS 20 174351; Bulletin 7802. Prepared for the Federal Energy Administration, Office of Transportation Policy Research.

Roberts, PO Terziev, MN Kneafsey, JT Wilson, LB Samuelson, RD Chiang, YS Deephouse, CV  
Massachusetts Institute of Technology CTS-76-14, Nov. 1976, 174 pp  
Contract CO-04-50154-00

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

#### 20 174351 USER MANUAL FOR FREIGHT TRANSPORTATION ANALYSIS SOFTWARE

A methodology for analysis of the impacts of various government and carrier policies on the demand for freight transportation has been developed. This report describes the computer programs included in this methodology. Work has focused on the choice of mode and shipment size if a receiver at a given destination were to choose a supplier in a specific origin. Programs first calculate the cost of each of the transport alternatives, identifying the least-cost option. Given a description of the population of receivers at a destination, a second series of programs applies costing and forecasting to each receiver, summing disaggregate forecasts into an aggregate forecast of modal tonnages for the origin-destination city pair. A third group of programs computes fuel consumed.

Terziev, MN Wilson, LB  
Massachusetts Institute of Technology CTS-76-18, Dec. 1976, 42 pp, 8 Fig., 4 App.

Contract CO-04-50154-00

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

#### 20 174355 A METHODOLOGY FOR ESTIMATING DETAILED INTERAREA COMMODITY FREIGHT FLOWS FROM CENSUS OF TRANSPORTATION DATA

The most widely used data available on U.S. interarea commodity freight flows comes from the public use tapes of the Census of Transportation Commodity Transportation Survey. This data set provides data on flows of specific commodities between states, as well as major production and market areas. Unfortunately, the completeness of this data is limited by the statutory requirement that the Census Bureau not release data which might reveal information about the operations of individual firms. As a result of this non-disclosure requirement, data are withheld on shipments of a particular commodity group whenever there were only a few firms sampled which made shipments in that commodity group. Since there is no way to determine the volume of flow for each of these unreported commodity groups directly from the Census data, the data are inadequate for freight transportation planning studies conducted at a detailed commodity level. This report presents an algorithm which has been developed for estimating the volume of each unreported area to area flows among specific commodity groups in proportion to the flows of these commodity groups in nationally aggregated data. The algorithm has been programmed. A listing of the program and necessary documentation is included as an appendix.

Prepared for U.S. Department of Transportation, Office of University Research, Analysis of Freight Markets.

Deephouse, CV Chiang, YS Roberts, PO Samuelson, RD  
Massachusetts Institute of Technology CTS-77-3, Feb. 1977, 16 pp, 4 Fig., 2 App.

Contract DOT-OS-50112

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

#### 20 174356

##### FORECASTING FREIGHT DEMAND

Freight transport demand is a matter that has received less than its share of attention both in the theoretical literature and in actual practice. The barriers to the development of appropriate freight transport demand forecasting techniques are developed and explained and methods for over-coming these barriers are suggested. The role of data both in the formulation and the use of the model is explained. Finally, a list of criteria for desirable features of a demand model are developed.

For presentation to the World Conference on Transport Research, Rotterdam.

Roberts, PO  
Massachusetts Institute of Technology CTS-77-6, Apr. 1977, 26 pp, 2 Fig., 4 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

#### 20 174358

##### TOFC SHUTTLE TRAINS: A STUDY IN EQUILIBRIUM ANALYSIS

The economics of many types of freight transportation services have been difficult to analyze, since demand for a service will depend on the rates and level of service offered by the carrier while carrier costs for maintaining a given level of service will vary with demand for the service. It is thus difficult to determine whether to offer a service, and what rate and level of service to maintain if the service is offered. This study shows how an equilibrium approach, involving the use of both demand and cost models, may be used to analyze such situations. The equilibrium approach is applied to analyze the feasibility of a T.O.F.C. "Shuttle Train" service between three city pairs. This type of service, using dedicated equipment in run-through trains, could offer shippers improved TOFC service, with a potential cost savings to the carriers. The analysis used a freight demand model developed for this study. The results suggest that such a shuttle service could not be operated profitably on a fully allocated cost basis between Los Angeles and San Francisco, and could be operated profitably on a fully allocated cost basis between Philadelphia and Cleveland or between Chicago and Houston only with the adoption of two-man crews. Several important uncertainties in these results are noted, however.

Prepared for U.S. Department of Transportation, Program of University Research, Analysis of Freight Markets.

Samuelson, RD Roberts, PO  
Massachusetts Institute of Technology CTS-77-9, June 1977, 80 pp, Figs., Tabs., 1 App.

Contract DOT-OS-50112

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

#### 20 174359

##### COFC VS. TOFC: A COMPARISON OF TECHNOLOGIES

This paper uses an equilibrium analysis to compare TOFC and COFC technologies, when used in a "shuttle train" service. The intermodal "shuttle train" service uses run-through trains of dedicated equipment to improve service to transportation consumers and perhaps lower costs to the carriers. The equilibrium approach applies both demand models and cost models to a service in order to determine the effect of alternative pricing and service policies on carrier profitability, as well as overall profitability of the service. Demand estimates and TOFC shuttle train cost estimates are taken from another study by the authors. Cost models from that study are modified and used to generate cost estimates for three types of COFC technology--one using all-purpose TOFC/COFC flatcars at a 40 mph average speed, and one using the lightweight COFC flatcars at a 50 mph average speed. Fuel consumption models are also developed for each of the technologies studied. The results suggest that the adoption of the lightweight COFC shuttle train technology could bring moderate reductions in operating costs, and substantial improvements in profitability and fuel consumption.

Prepared for the Federal Railroad Administration under an extension of FEA Project 50154 for the Federal Energy Administration, Office of Transportation Policy Research.

Samuelson, RD Roberts, PO  
Massachusetts Institute of Technology CTS-77-10, June 1977, 84 pp,  
Figs., Tabs.

Contract CO-04-50154-00

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

20 174373

**THE U.S. CASH TRADE IN 1974: PARTICIPANTS, TRANSACTIONS, AND INFORMATION SOURCES**  
No Abstract.

Heifner, RG  
Economic Research Service No. 386, Sept. 1977, 73 pp, Tabs., Apps.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: Department of Agriculture, Independence Avenue, Between 12th and 14th Streets, SW, Washington, D.C., 20250

20 174520

**ELSA: AN ELECTRIC POWER SUPPLY ANALYSIS MODEL FOR THE PACIFIC NORTHWEST**

Battelle, Pacific Northwest Laboratory (PNL) is conducting a program to help assess impacts of energy-related developments through the year 2025 in six northwestern states--Washington, Oregon, Idaho, Montana, Wyoming and Alaska. ELSA (Electric Power Supply Analysis Model), one component of this overall program, is a simulation model of the electric supply system in the Pacific Northwest designed to better define future effects of electrical developments. It permits the analyst to examine the structure of the electric utility industry, to postulate possible scenarios and policy decisions, and to test their effect on the cost and availability of power. ELSA is divided into three major sectors: production, regulatory, and construction. The production sector uses the installed generating capacity of five types of facilities (hydroelectric, nuclear, coal-fired, oil-fired, and combustion turbines) and the requirements for electricity to compute the electrical reserve capacity and the system load factor. The regulatory sector uses information from the production sector and a number of exogenous variables such as capital costs, fuel costs, and tax rates to determine the price of electricity as well as other financial variables. The construction sector performs three major functions: (1) forecasts the amount of new construction needed, (2) determines the amount of new construction that can be financed, and (3) decides the types of new generating capacity which should be initiated. Future work with ELSA is described. (ERA citation 02:060029)

Harrington, TP Jacobsen, JJ  
Battelle Memorial Institute/Pacific Northwest Labs, Energy Research and Development Administration Nov. 1976, 103 pp

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS  
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BNWL-2084(RAP-8)

20 174615

**ENERGY RELATED IMPACTS ON GREAT PLAINS AGRICULTURAL PRODUCTIVITY IN THE NEXT QUARTER CENTURY, 1976-2000**

Contents: The food demand dimension; Agriculture's relationship to national energy goals; Assumptions relating to great plains agriculture; Agricultural energy usage in perspective; The emerging energy usage transition agenda; General energy related agricultural adjustment concepts; Operational and technological adjustments in energy intense components; Agribusiness impacts and adjustments; Forests and energy; Effects of great plains energy resource development on agriculture; Institutional and agency program demands.

Library of Congress catalog card no. 77-623707.

Nebraska University, Lincoln GPAC-82, 1976, 30 pp

ACKNOWLEDGMENT: NTIS  
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PB-274136/1ST

20 174624

**ENERGY DEMAND MODELING AND FORECASTING**

This report describes and presents results from an all-energy econometric demand model. The model forecasts the demand for electricity, oil, natural gas, and coal for the Pacific Northwest as a whole, for the states of Idaho, Washington, and Oregon separately, and individually for seven distinct economic sub-regions therein. Individual forecasts were prepared for the residential, commercial, and industrial sectors and (by two-digit SIC code) transportation and irrigation.

Prepared by Mathematical Sciences Northwest, Inc., Bellevue, Wash. Sponsored in part by Pacific Northwest Regional Commission, Vancouver, Wash. See also PB-274 337.

McHugh, WM  
Northwest Energy Policy Project, Mathematical Sciences Northwest, Incorporated, Pacific Northwest Regional Commission 1977, 277 pp

ACKNOWLEDGMENT: NTIS  
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PB-274336/7ST

20 174655

**POTENTIAL SITES FOR COAL CONVERSION FACILITIES IN ILLINOIS**

This report defines the physical characteristics of sites for coal gasification and liquefaction plants, identifies relevant constraints for the sites and determines candidate areas within the State of Illinois where sites could be located.

Hoglund, BM Asbury, JG  
Environmental Technology Assessment, Incorporated, Institute for Environmental Quality IIEQ-74-60, Oct. 1974, 128 pp

ACKNOWLEDGMENT: NTIS  
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PB-274673/3ST

20 174660

**WESTERN COAL: PROMISE OR PROBLEM**

Public policies affecting the disposal of public domain lands for future coal production are examined. The study is divided into two major parts. The first deals with micro or leasehold aspects of coal leasing--factors related to ownership patterns, logical mining units, leasing policies, end uses of coal (and the attendant impacts on fair market value) and intertract competition questions. The second evaluates macro or leasing schedule aspects of western coal development. The pace of leasing through time and its location, as dictated by demand (magnitude and location), transportation economics, geology and production economics (by mining area) is examined. The emphasis is on western surface mining possibilities.

Tyner, WE Kalter, RJ Wold, JP  
Cornell University Agricultural Experiment Station, National Science Foundation Res. Rpt. A.E. RES-77-13, NSF/RA-770291, Aug. 1977, 186 pp

Grant NSF-SAI74-21846

ACKNOWLEDGMENT: NTIS  
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PB-274696/4ST

20 174693

**SOLID WASTE MANAGEMENT IN ILLINOIS. VOLUME I. BASIC DATA**

Contents: Solid waste generation system (Population, residential, commercial, and institutional solid waste generation, Industrial solid waste generation, Agricultural solid waste generation, Mineral extraction); Governmental system (Responsibilities, Local levels, Regional levels, State level); Transportation system (Highways, Railroads, Waterways); Natural resources (Geology, Geology and Sanitary landfill, Hydrology, Bedrock, Groundwater levels, Climatology, Climatology and sanitary landfill, Combined effects of natural factors); Technology options.

See also Volume 3, PB-275 080.

Weston (Roy F), Incorporated, Institute for Environmental Quality, (IIEQ-40.001) Final Rpt. IIEQ-74-51, 1974, 340 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275079/2ST

20 174932

**APPLICATION OF NEAR-TERM FOSSIL TECHNOLOGIES TO THE ENERGY SUPPLY/DEMAND PROFILES OF THE U.S. STATES AND REGIONS**

The following conclusions emerge from this study for the Office of Program Planning and Analysis, ERDA/Fossil Energy: Based on energy supply and utilization, the five regions with the most critical energy problems, in order of severity, are: the North Central, the West South Central, the Middle Atlantic, the South Atlantic and New England. The following near-term technologies appear to offer the widest application and are most likely to have a major impact on the supply/demand energy characteristics of the regions: Direct combustion of coal in atmospheric fluidized beds; low-Btu gas from coal for power generation and combined cycles; power plant technology; high-Btu gasification in entrained and fluidized beds; improved railroad coal-handling facilities; direct combustion by fuel substitution; low-Btu gas for process heat; improved underground and surface coal extraction techniques; coal slurry and coal-gas pipeline transport systems; and conservation in the residential/commercial and vehicular transportation sectors. Transportation systems (e.g., railways, pipelines, ships) are vital linkages between the fossil energy supply centers and the fossil energy demand facilities. ERDA's programs should consider energy in a total systems sense, including transportation systems as well as supply and demand technologies. Further analysis of the economics of coal conversion is necessary. The elasticity of the price of both natural gas and petroleum products should be studied. Significant changes in the utilization patterns could occur if the prices of the various fossil fuels were coordinated. Direct combustion and low-Btu gasification of coal could help alleviate this problem. Other recommendations involve new regional divisions with compatible energy supply, demand and utilization characteristics and increased contacts and direct working relationships between ERDA representatives and state energy officials. (ERA citation 02:051972)

Systems Consultants, Incorporated, Energy Research and Development Administration Jan. 1977, 186 pp

Contract EX-76-C-01-2442

ACKNOWLEDGMENT: NTIS  
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FE-2442-1

20 174946

**STATE ENERGY FLOW PATTERNS**

Highly visual and self-explanatory 1975 energy flow diagrams are presented for each of the 50 states and for the entire United States. Each diagram illustrates the energy produced and how it is consumed or lost. The diagrams are meant to serve as a convenient and useful reference (or starting point) for consideration of energy-related problems. (ERA citation 02:060044)

International conference on energy use management, Tucson, Arizona, USA, 24 Oct 1977.

Kidman, RB Barrett, RJ  
Los Alamos Scientific Laboratory, Energy Research and Development Administration CONF-771009-2, 1977, 60 pp

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS  
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LA-UR-1297

20 174947

**PATTERNS OF ENERGY PRODUCTION IN THE SOUTHWEST**

The southwest states of Arizona and New Mexico are energy rich, particularly New Mexico. Data is presented establishing the region's position with respect to coal, oil, gas, and uranium resources. Further, this status is reflected in current patterns of energy production, data on which are presented. Additionally, price information is presented which explains, in part, current energy production patterns in the region. (ERA citation 02:059975)

American Society of Mechanical Engineers symposium on the impact of energy development in the southwest, Albuquerque, New Mexico, United States of America (USA), 17 Mar 1977.

Kolstad, CD  
Los Alamos Scientific Laboratory, Energy Research and Development Administration CONF-770336-1, 1977, 5 pp

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

LA-UR-77-685

20 175310

**RAILROAD IMPACT STUDY-63 RAIL LINE SEGMENTS IN SOUTH DAKOTA. APPENDIX**

The appendices are incorporated in a separate volume for ease of handling. The tables and data will be of value to those who may want to conduct more in depth analysis. The appendices contain detailed information on the entire state of South Dakota and on the 63 rail line segments.

Prepared in cooperation with South Dakota Task Force on Railroad Policy, and South Dakota Dept. of Transportation, Pierre. See also PB-276 934.

Poth, LA Peterson, J  
South Dakota University, Vermillion, South Dakota Department of Transportation, Economic Development Administration BULL-124-APP, EDA-78-033, Dec. 1977, 821 pp

Grant EDA-05-06-01592

ACKNOWLEDGMENT: NTIS  
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PB-276935/4ST

20 175311

**RAILROAD IMPACT STUDY-63 RAIL LINE SEGMENTS IN SOUTH DAKOTA**

The primary concern of the study (in 2 volumes) was the trade area served by a rail line. The trade area was determined on the assumption that a farmer will haul his grain to the nearest elevator located on a railroad line. The basic approach in this study has been to measure potential demand for rail transportation, not to analyze the traffic data accumulated in the recent past. The first five chapters give the summaries for the entire state of South Dakota. The rail line segments have been revised and recorded to comply as nearly as possible, with that, used by the various railroad companies. Some railroad data would be made available for this study that would provide a basis for estimating the rail potential in the major cities of South Dakota.

Prepared in cooperation with Task Force on Railroad Policy and South Dakota Dept. of Transportation, Pierre. See also Appendix, PB-276 935.

Poth, LA Peterson, J  
South Dakota University, Vermillion, South Dakota Department of Transportation, Economic Development Administration BULL-124, EDA-78-034, Dec. 1977, 218 pp

Grant EDA-05-06-01592

ACKNOWLEDGMENT: NTIS  
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PB-276934/7ST

20 175346

**FORECAST OF DEVELOPMENTS IN DOMESTIC MINERALS TRANSPORT**

A study was undertaken of the current situation and prospective developments in domestic transport of nonenergy minerals. The four major modes of transport were covered: railroad, highway, water, and pipeline. In the first phase of the study, a metal (copper) and a nonmetal (phosphate rock) were selected and studied in depth. Various problems facing shippers and carriers of these minerals were identified. The second phase of the study expanded the scope to all nonenergy minerals and qualitatively forecast developments into the future. Estimates of increased fuel prices for each mode of transport were applied to assess expected changes in transport cost and modal competition. For some of the key issues facing domestic transport of minerals, possible actions for the Bureau of Mines include further analysis to identify the impact of policy options.

Weinblatt, H Matzzie, DE  
CONSAD Research Corporation, Bureau of Mines Final Rpt. Bu-Mines-OFR-4-78, Nov. 1977, 230 pp

Contract J0166002

ACKNOWLEDGMENT: NTIS  
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PB-276560/OST

20 176095

## REGIONAL SCIENCE AND ENERGY POLICY: A METHODOLOGY FOR THE ASSESSMENT OF COAL UTILIZATION IN THE NORTHEAST

A methodology for the assessment of increased coal utilization in the Northeast is presented, resting on an ensemble of energy-economic, siting and environmental quality models. The assessment process is focused on the three major categories of coal-related issues in the Northeastern United States: the air quality and health impacts of coal combustion with emphasis on the inter-regional transport of air pollutants; the issues associated with coal supply given the Northeast's unfavorable geographic location and its declining railroad system; and the regional economic development issues that follow from alternative national coal technology development pathways. In recognition of the many gaps in knowledge that still exist, particularly in regard to pollutant emissions from advanced coal conversion technologies, and dose response functions for health impact assessment, priority is also given to the ability to identify uncertainties and areas where further R and D would most benefit the certainty of subsequent assessment predictions. (ERA citation 03:016561)

Northeast regional science meeting, Halifax, Canada, 28 May 1977.

Meier, PM

Brookhaven National Laboratory, Department of Energy CONF-7705102-1, 1977, 40 pp

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS

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BNL-22792

20 176100

## MODELING LONG-TERM COAL PRODUCTION WITH THE ARGONNE COAL MARKET MODEL

The Argonne Coal Market (ACM) Model was developed as part of the National Coal Utilization Assessment, a comprehensive study of coal-related environmental, health, and safety impacts funded by the Energy Research and Development Administration. The model has a relatively high degree of regional detail on both supply and demand. Coal demands are forecasted by a combination of trend and econometric analysis. Coal supply in each region is characterized by a linearly increasing function relating increments of new mine capacity to the marginal cost of extraction. Rail transportation costs and control technology costs are estimated for each supply-demand link. A quadratic programming algorithm is used to optimize flow patterns for the system. (ERA citation 03:018435)

Symposium on systems and decision sciences, Berkeley, CA, USA, 2 Oct 1977.

Dux, CD Krohm, GC VanKuiken, JC

Argonne National Laboratories, Department of Energy 1977, 8 pp

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS

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CONF-771005-7

20 176101

## NATIONAL COAL UTILIZATION ASSESSMENT: SOME POTENTIAL IMPACTS IN THE SOUTH

The National Coal Utilization Assessment is a two-year program, sponsored by the Department of Energy, to assess the potential environmental, social, and economic effects of coal development and use at the national and regional level. The Oak Ridge National Laboratory (ORNL) is one of six national laboratories participating in the program and is conducting the assessment in the 12-state southern region. The assessment is designed to analyze regional and national effects of an energy policy of increased coal use. A recent national energy trends scenario was disaggregated as a basis for forecasting future energy demands for the southern region for 1985, 2000, and 2020. Based on these forecasts and existing energy generation capacities, ORNL developed a plausible county-level siting pattern for future coal-fired power generation, liquefaction, and gasification plants. Future coal mine production was also forecast for the region. These patterns of coal development and consumption were used to identify and assess the potential environmental, social, and economic effects likely to be experienced in the southern region for the forecast period. Additional energy scenarios and more detailed studies are currently underway as part of the second year of the coal assessment. (ERA citation 03:013746)

Southern Economic Association meeting, New Orleans, LA, USA, 2 Nov

1977.

Davis, RM Honea, RB Dobson, JE Berry, LG

Oak Ridge National Laboratory CONF-771135-2, 1977, 28 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS

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CONF-771143-1

20 176109

## COAL PRICE FORMATION. FINAL REPORT

The Energy Supply program of the Electric Power Research Institute (EPRI) is concerned with factors affecting prices and availability of energy, especially as they affect the planning of research and development in new electricity-related technologies. Understanding the future behavior of coal supply and prices is of particular interest to EPRI, and to electricity planners, because coal and nuclear energy are expected to be the two principal energy sources for electricity generation for the remainder of this century. After two decades of stagnation from the end of World War II to the mid-1960s, the coal market has entered a phase of rapid growth in a complex, uncertain context of increased government regulation, changed labor supply and transportation conditions, increased attention to western producing areas, and potential use of coal as a feedstock for synthetic fuels. Planners and decision makers in the electric utility industry, in other coal-related industries, and in government must evaluate their short-and long-term strategies in a context of uncertainty, imperfect tools, and incomplete information for analysis and forecasting of fuel availability and prices. Many efforts are underway to increase understanding of energy markets in general and coal supply in particular. This study is part of this overall effort and is intended for use both by individuals wanting to make more-informed judgments about future trends in coal prices and by specialists developing improved data systems and highly sophisticated models of coal markets. (ERA citation 03:016562)

Charles River Associates, Incorporated Dec. 1977, 212 pp

ACKNOWLEDGMENT: NTIS

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EPRI-EA-497

20 176139

## SOME LONG-RANGE SPECULATIONS ABOUT COAL

Should the world demand for energy increase sixfold within the next 50 years, largely because the underdeveloped countries industrialize, and if half this demand is met by coal, then the estimated world recoverable resource of coal of  $4 \times 10^{12}$  metric tons would last at this asymptotic level about 140 years. The carbon dioxide concentration in the atmosphere is then estimated to increase about threefold. These two eventualities may place limits on our ultimate use of coal. The risk of a CO<sub>2</sub> accumulation inherent in the widespread use of coal is in a sense analogous to the risk of nuclear proliferation: both problems are global, uncertain, and could pose profound challenges to man's future. (ERA citation 03:016467)

Weinberg, AM Marland, GH

Oak Ridge National Laboratory, Department of Energy Aug. 1977, 18 pp

Contract EY-76-C-05-0033

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

ORAU/IEA(O)-77-22

20 176462

## APPROACH TO MEASUREMENT OF MODAL ADVANTAGE

Shipper preferences for truck or rail were determined by using shipment mass and distance as criteria. Data on individual manufactured commodities from the 1972 Census of Transportation Commodity Transportation survey were arranged in a matrix-table format and analyzed for the extent of involvement by these primary modes in carrying cargo of various weight brackets moving over a series of distance blocks. As expected, trucks dominated the movement of lighter weight shipments and rails dominated the movement of heavy shipments. Competition, or involvement by both modes, was limited to cargo in the medium-weight range, which was not an extensive amount. Amounts of cargo either modally dominated or competitive were determined and correlated to actual overall percentages of cargo by mode. Changes in overall modal percentages of cargo over time have a strong relationship to changes in the size of shipments over time, although not as strong and direct a relationship for the rail mode as for trucking.



Major shifts of cargo between modes will not occur in the absence of artificial or arbitrary obstacles to market forces.

This article appeared in the Transportation Research Record No. 637, Forecasting Passenger and Freight Travel.

Roth, RD (American Trucking Associations) *Transportation Research Record* No. 637, 1977, pp 62-70, 1 Fig., 8 Tab.

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#### 20 176467

##### ANALYSIS OF RAIL-WATER PRICE COMPETITION

The pricing debate between the water carriers and the railroads is examined. Water carriers assert that railroads discriminate against them in pricing, and railroads assert that they price in a manner that will permit them to hold on to traffic that would otherwise be lost to their unregulated competitors. Both assert that their pricing practices benefit society. Competitive rail pricing practices and their effects on water carriers, shippers, railroads, and the general public are discussed. /Author/

This article appeared in the Transportation Research Record 635, Price and Subsidy in Intercity Transportation and Issues of Benefits and Costs.

Hymson, EB (Department of Transportation) *Transportation Research Record* No. 635, 1977, pp 6-11, 9 Ref.

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#### 20 176704

##### INCREASING COAL DEMAND--SLURRY VERSUS RAIL

For almost 15 years the most common method of moving coal from mine to consumer has been the unit-train. A single 11,000 ton capacity train of three to seven locomotives, depending on the gradients along the route, pulling 110 ton X 100 ton capacity rail cars over a dedicated route. But with the renaissance of coal as a power source, and being demanded in such vast quantities, there are doubts whether the railroads have the potential to carry as much as 61 per cent of the nation's annual production which is expected to increase from a 1976 level of 665 million tons to 1260 million tons in 1985. Against this background the slurry pipeline concept, direct from mine to power generating station, is favored by many. However, to build pipelines would mean crossing railroads and with railroads holding the right of eminent domain--the right to prevent constructions passing above or below the railbed--the railroads have so far blocked any pipeline progress.

*Cargo Systems International* Vol. 4 No. 11, Nov. 1977, 3 pp

ACKNOWLEDGMENT: EI

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#### 20 176880

##### NATIONAL ENERGY TRANSPORTATION. VOLUME I. CURRENT SYSTEMS AND MOVEMENTS

This report is the first volume of a three-volume study on the transportation of energy resources in the United States. It explains the modes by which each basic form of energy is carried, its historical background, the basic technology required, and describes the current movements, the industries involved, and the flexibility of different systems. It is intended to serve as a basic source of information concerning current energy transportation, and as back-ground for volumes two and three of the study, which deal with the Federal role in energy transportation and impending energy transportation issues respectively. The report is accompanied by nineteen maps of energy movements and modes which show in graphic form the types and amounts of energy used, their sources, points of consumption, and patterns of flow. The maps also display the systems of transportation used for energy movement, the production and consumption of energy by State, and the geographic extent and nature of the energy resources drawn upon. The data on which the maps are based, the information sources, and the necessary assumptions made are presented. Data are compiled on coal, petroleum, petroleum products, natural gas, and electric power transmission.

Maps jointly prepared by U.S. Geological Survey and the Congressional Research Service.

Congressional Research Service 1977, 608 pp

ACKNOWLEDGMENT: Energy Research Abstracts

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#### 20 177190

##### RAILROADS VS PIPELINES: THERE'S ROOM FOR BOTH

The author examines the controversy between railroad executives and pipeline advocates that has recently been intensified by a government-financed study on comparative coal transportation costs. The comprehensive U. S. Bureau of Mines report, which analyzes the costs of moving coal by slurry pipelines and unit trains from the northern Great Plains to midwestern and southern markets and from Appalachia to major eastern cities, gives no recommendations as to which method is best. The author also analyzes advantages and shortcomings of both these means of coal transportation.

Guccione, E *Coal Mining and Processing* Vol. 15 No. 2, Feb. 1978, 5 pp, 1 Ref.

ACKNOWLEDGMENT: EI

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#### 20 177401

##### HOW WILL ALL THE COAL BE SHIPPED?

Whether announced goals are reached or not, there is already a large scale swing by utilities toward the use of coal in future additions to electric generating capacity. How this added coal production is to be transported is raising a number of questions about the country's ability to reach the goals set. This article analyzes the capabilities of the proposed means of transporting coal: by railroads, by barges, by motor trucks and conveyor belts (short-haul, from mine to utility) and by slurry pipelines. Consideration is given to the problems of providing sufficient new equipment for all these systems. Based on present projections of the share of the load to be carried by each type of transport, railroads face the greatest challenge, and slurry pipelines, where practicable, offer considerable economic advantages.

Miskell, JT *Energy* Vol. 3 No. 1, 1978, pp 6-8

ACKNOWLEDGMENT: EI

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#### 20 178145

##### JOINT ALUMINUM-COPPER FORECASTING AND SIMULATION MODEL

This study, prepared for the U.S. Bureau of Mines, is directed toward developing a world-wide econometric model of aluminum and copper which describes the interaction between the two markets. The model specification is dynamic and based on both economic theory and on our understanding of the operation of the copper and aluminum markets. Demand for each metal is disaggregated regionally and, within the United States, on a consuming industry basis. The regional demand for each metal is specified for total U.S., Europe, Japan and Total-Free-World. Rest-of-Free-World is generated algebraically from these totals. Primary ingot prices for aluminum and copper depend on production costs, a key feature of the model, and current market conditions as reflected in capacity utilization rates.

Proc Counc Econ, 106th AIME Annual Meeting, Atlanta, Georgia, March 6-10, 1977 and Compr Subj and Author Indices to 1974-1977 Proc.

Pikard, WC (Synergy, Incorporated); Krumm, RJ  
American Inst of Mining, Metallurg & Petrol Engrs *Proceeding* 1977, pp 77-87, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

#### 20 178154

##### POLICY IMPLICATIONS OF NEW ENGLAND IMPORT DEPENDENCY OF FUEL CHOICES FOR ELECTRIC POWER GENERATION IN NEW ENGLAND

Prospective federal legislation gives the federal government authority to order existing natural gas and oil-fired electric generating plants and new electric power plants to utilize coal as their primary fuel. It is anticipated that if such a policy were implemented in New England, attainment of regional energy, environmental and economic objectives might be jeopardized by increased electric costs and elevated air pollution levels. This paper examines these economic and environmental consequences of coal utilization and is based on two analyses: the first of new coal-fired power plants and the second of two existing oil-fired plants that could be converted to coal. All are located at relatively urbanized sites in New England.

Proc Counc Econ 106th AIME Annual Meeting, Atlanta, Georgia, March 6-10, 1977 and Compr Subj and Author Indices to 1974-1977 Proceedings.



Clark, PB (Center for Energy Policy, Incorporated); Hearing, DW  
American Inst of Mining, Metallurg & Petrol Engrs Proceeding 1977, pp  
89-106, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Inst of Mining, Metallurg & Petrol Engrs, 345  
East 47th Street, New York, New York, 10017

20 178269

## FEASIBILITY STUDY OF MINING ALASKA COAL AND TRANSPORTATION BY SLURRY TO THE WEST COAST

The extensive subbituminous coal deposits near Cook Inlet, Alaska, have received considerable attention because of their size, nearness to tidewater, and low sulfur content. As the need for increased electrical power is felt along the west coast, a search is being made for sources of fuel other than petroleum and natural gas. The State of Washington is the only Pacific Coast State with substantial coal resources, but because of geologic setting, much of this resource will be available only at high cost. Reflecting these circumstances, if coal is to be used as a source of electrical energy, it may be transported from the Northern Great Plains or Rocky Mountain areas or from more remote sites if they happen to be located at or near tidewater. It is this latter situation that is represented by Cook Inlet coal since it lends itself to relatively cheap ocean transport and hence is potentially economically competitive with coal that must be brought to the west coast by overland transport.

Anderson, D  
Washington University, Seattle Jan. 1978, 37 pp, 5 Fig.

Grant G-0264012

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: NTIS

PB-278755/AS

20 178270

## APPENDIX: COOK INLET COAL: ECONOMICS OF MINING AND MARINE SLURRY TRANSPORT

This report gives a general description of the Beluga coal deposits on Cook Inlet, Alaska, and evaluates mining and transport costs to move the coal to a potential steam-electric plantsite in northern Washington State as a marine slurry. A surface minesite is chosen 15 miles from tidewater, and the coal is mined, washed, slurried, and transported by pipeline to tidewater where it is loaded aboard ship as a settled marine slurry. The coal is carried by ship to northern Washington, reslurried and pumped off the ship to dewatering facilities. Costs for mining, washing, preparation, transport, and dewatering are developed per ton of clean coal and final costs per million British thermal units. Production rates are evaluated to fuel 1,000-and 2,000-Mw plants with 80 percent annual output factor. Slurry pipelines are evaluated for 24-and 20-inch diameters. Ship sizes evaluated are 70,000, 79,000, and 100,000 dead-weight tons.

Hennagin, BD  
Washington University, Seattle Jan. 1978, 95 pp, 5 Fig.

Grant G-0264012

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: NTIS

PB-278756/AS

20 178273

## IRON ORES [Les minerais de fer]

Papers read at the Seminar on iron ore in the world, (Paris 7 July 1977), organised by the "Association technique de la Siderurgie francaise": Considerations on the universal nature of iron-ore problems; Probable trend in the balance between production and consumption; World iron-ore resources and evaluation of their use; The Guelbs project in Mauritania; The Klahoyo Mountain project, Ivory Coast; The Belinga fields in Gabon (construction of the first section of the Trans-Gabonese Railway); The Mifergui-Nimba project (linked to the building of the Trans-Guinean Railway). [French]

*Revue de Metallurgie* No. 2, Feb. 1978, pp 61-131, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

20 178280

## FORECASTING THE DEMAND FOR RAILWAY FREIGHT SERVICES

In this article, an econometric model for the railways is developed for the purpose of analyzing the rail freight transport demand, dealing separately with volume and distance. The explanatory variables include predicted production of the commodity concerned, exports as a fraction of production, average vehicle payload, and the number of trucks registered in Canada.

Someshwar Rao, P *Journal of Transport Economics and Policy* Vol. 12 No. 1, Jan. 1978, pp 7-26, 10 Tab., 1 Phot., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

DOTL JC

20 178438

## IDENTIFICATION OF FREIGHT TRAFFIC FLOWS WITH A VIEW TO THEIR INCORPORATION IN THE TRANSPORT PLANNING PROCESS [Die Erfassung des Gueterverkehrs zum Zwecke seiner expliziten Beruecksichtigung in Verkehrsplanungsprozessen]

A functional element of the organised economic activity process is the flow of freight traffic. There consequently exists a causal relationship between the freight volume to be carried, and the country's economic structure and its urbanisation pattern. [German]

Schmidt, HG  
An die Stadtverwaltung-Stadtbauwesen DB: Dok 4678, 1977, 372 pp,  
Tabs., Photos., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: An die Stadtverwaltung-Stadtbauwesen, Institut fuer Stadt-  
bauwesen RWTH, Aachen, West Germany

20 178499

## NOTES ON THE ELASTICITY OF DEMAND FOR FREIGHT TRANSPORTATION

This study is of the various forms of elasticity analyses and empirical estimates available. Price and modal-choice are investigated. This is followed by discussion of quality considerations and then empirical estimating methods are examined. It is concluded that even the sophisticated transport demand estimates may have little relation to reality and knowledge is woefully incomplete, even where careful studies have been made.

Wilson, GW (Indiana University, Bloomington) *Transportation Journal*  
Vol. 17 No. 3, 1978, pp 5-15, 2 Fig.

ORDER FROM: American Society of Traffic and Transportation, 547 West  
Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

20 179069

## WORLD COAL TRADE DEVELOPMENTS

Coking coal dominates world trade in coal, and if projected worldwide demands are to be satisfied its availability in Australia, Canada and the USA must increase faster than home demand. In this survey of likely world energy trends, the Director of the NCB's Central Planning Unit forecasts a doubling in world coal trade by the mid-1980s, with steam coal becoming the principal growth sector in the longer term.

Parker, MJ *Coal and Energy Quarterly* No. 15, 1977, pp 10-13

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 179152

## COAL TODAY AND TOMORROW: A FUNDAMENTAL ELEMENT IN THE ENERGY SUPPLY IN WESTERN EUROPE

[Le charbon aujourd'hui et demain, element fondamental de  
l'approvisionnement en energie de l'Europe occidentale]

Since world energy resources are dwindling and prices are increasing the energy policy of the European Community must realise the increasing importance of coal. [French]

Association of the Coal Producers of Eur Community SNCF Cat 20  
N263, Dec. 1977, 70 pp, Tabs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Association of the Coal Producers of Eur Community,  
Avenue de Tervueren 168, 4e etage, B-1150 Brussels, Belgium

20 179978

**EVALUATING MULTIMODAL TRANSPORTATION  
ALTERNATIVES**

A method for developing an evaluation methodology for multimodal intercity freight transportation in a specific corridor is presented. The area from Kansas City, Miss., to Brunswick, Ga., is used as a test corridor for the application of the multimodal concept. The unique aspects of the project limited the application of previous research because of: (1) The project scope; (2) the emphasis on goods movement; (3) the significance of economic development potential; and (4) the multimodal approach. A sequential decision process was used in developing the evaluation framework: (1) An

initial determination of which factors to include in the analysis was made; (2) a method for screening factors considering their utility in the final evaluation scheme was developed; (3) a method permitting flexible weighing of the factors chosen was determined; and (4) a method for identifying the individuals or groups who participate in the evaluation process (i.e., whose viewpoints are to be considered) was proposed. An interactive computer system to assist in the compilation and analysis of the individual evaluations is presented.

Lipinski, ME (Memphis State University) *ASCE Journal of Transportation Engineering* Vol. 104 No. 3, May 1978, pp 253-265, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

21 169276

## STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 14. MODELS FOR INVESTIGATING TRAIN CONNECTION RELIABILITY AT RAIL CLASSIFICATION YARDS

This report presents models for predicting train connection performances at rail freight classification yards. The probability of making a connection is influenced by the time available to make the connection, dispatching policy, traffic volumes, priorities, train reliability, and overall yard performance. The report contains models of the probability of making a train connection that were calibrated for four Southern Railway hump yards. These models can be used with train schedule information to predict average yard times. In this report, several examples demonstrate ways to improve yard performances: avoiding tightly scheduled connections, revising train schedules, improving train reliability, reducing train and block cancellations, and adjusting classification policy as the traffic mix changes. Several of these are illustrated with data developed during the Southern Case Study. The report closes with recommendations for improving yard performance.

See also Volume 13, PB-244 130.

Kerr, PA Martland, CD Sussman, JM Philip, CE  
Massachusetts Institute of Technology, Federal Railroad Administration  
Final Rpt. FRA/OPPD-77/23, MIT-R76-44, Nov. 1976, 141 pp

Contract DOT-FR-10006

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275432/3ST, DOTL NTIS

21 169301

## IMPROVED RAILROAD OPERATIONS USING A RAILROAD AUTOMATED IDENTIFICATION AND LOCATION SYSTEM. VOLUME 1: NEW PROCEDURES FOR MAKING TACTICAL OPERATIONS PLANNING DECISION

This volume documents the new tactical operations planning procedures developed to interface with the Grand Trunk's Railroad Automation Identification and Location System (RAILS). The tactical planning procedures for dispatching and yard management are described in detail, and the results of on-line experiments are presented. (Portions of this document are not fully legible)

See also Volume 2, PB-275 592. Prepared in cooperation with Grand Trunk Western Railroad Co., Detroit, Mich.

Wong, PJ Conrad, B Elliott, CV Johnson, JM Tashker, MG  
SRI International, Grand Trunk Western Railroad Company, Federal  
Railroad Administration, (SRI-3605) Final Rpt. FRA/OPPD-77/18,  
Oct. 1977, 232 pp.

Contract DOT-FR-45020

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275591/6ST, DOTL NTIS

21 169302

## IMPROVED RAILROAD OPERATIONS USING A RAILROAD AUTOMATED IDENTIFICATION AND LOCATION SYSTEM. VOLUME 2: DMP TECHNICAL DOCUMENTATION

This volume documents the dynamic movement predictor (DMP), a railroad simulation model designed to interface with the Grand Trunk's Railroad Automated Identification and Location System (RAILS). A set of procedures detailing how to use the model is presented, validation of the model is discussed, and the construction of the model is documented. (Portions of this document are not fully legible)

Prepared in cooperation with Grand Trunk Western Railroad Co., Detroit, Mich. See also Volume 1, PB-275 591.

Tashker, MG Elliott, CV Hathorne, MR  
SRI International, Grand Trunk Western Railroad Company, Federal  
Railroad Administration, (SRI-3605) Final Rpt. FRA/OPPD-77/19,  
Oct. 1977, 140 pp

Contract DOT-FR-45020

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275592/4ST, DOTL NTIS

21 170937

## CRITERIA AND METHODS OF DETERMINING OPTIMAL LOCOMOTIVE DRIVING STRATEGY [Kryteria i metody okreslenia optymalnego sterowania pojazdem trakcyjnym]

The article defines performance quality criteria and the methods for selecting the optimal strategy for locomotive operation. The subject is discussed from three standpoints: minimal energy consumption for engine propulsion; optimization of journey time; and the balance between the cost of power for traction and the social cost of journey time. [Polish]

Kacprzak, J *Pojazdy Szynowe* No. 2, 1977, pp 22-27, 3 Tab., 2 Phot., 25 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: *Pojazdy Szynowe*, Warsaw, Poland

21 172638

## A TRAIN DISPATCHING MODEL FOR LINE CAPACITY ANALYSIS

To estimate the performance and capacity of specific railway lines, the ICC Rail Services Planning Office has developed a train dispatching model. For a specified set of variables the model simulates the dispatching of trains and the resulting interaction of trains along the line. The model can determine the practical capacity of a line; identify factors which constrain capacity; estimate capacity increases available from modification of existing constraints; and predict changes in performance likely to result from reducing to single track, adding a second track, installing CTC, imposing speed restrictions or changing the types of train services offered.

Interstate Commerce Commission Exec Summ Jan. 1976, 25 pp, 9 Fig.

ACKNOWLEDGMENT: Interstate Commerce Commission  
ORDER FROM: Interstate Commerce Commission, Rail Services Planning  
Office, Washington, D.C., 20423

DOTL RP

21 172665

## TRANSPORT PLANNING IN INTERNATIONAL FREIGHT TRAFFIC BY RAIL [Transportplanungen im internationalen Eisenbahngueterverkehr]

Transport planning aims at evening out peaks, regulating traffic flows and making optimum use of capacities. It has had successful results on routes to Italy and the Near East, been well received by customers, and has helped to improve the competitive position of the railways. [German]

Krenkel, G Petri, H *Die Bundesbahn* Vol. 53 No. 11, Nov. 1977, pp 811-814, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

21 173153

## EFFICIENT SHUNTING WITH CONSIDERATION OF THE PHYSICAL STRESS ON THE CREW [Ein Betriebsgerechter Rangierablauf unter Beruecksichtigung der Koerperlichen Belastung]

The problem dealt with in this paper is as follows: If in an in-plant railroad (carrying people and freight) of a steel plant the jobs of locomotive engineer and shunting engineer (or engineers) are combined and the locomotive is telecommunication equipped, is the man filling this job overworked. After evaluation, in terms of time and energy spent, recommendations are made to ensure efficient shunting without overburdening the crew. [German]

Wolf, KH *Stahl und Eisen* Vol. 97 No. 17, Aug. 1977, pp 810-814

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

21 173611

## THE AUTOMATIC RUN-OFF PROCEDURE IN THE MARSHALLING YARD

This paper exposes the reasons why an automated marshalling yard is not compatible with the free running of wagons from the hump. If the humping procedure has to be automated, the pre-conditions have to be created. Best suited for this purpose is the switching road through which the train to be sorted must be pushed at low speed (1.25 m/sec), while the switches are thrown under the proceeding train, and the clearing of points is secured by a switch raker. With the disappearance of the hump there is no further need for wagon retarders with their expensive and complicated operating system:

Garbers, E *Rail International* Vol. 8 No. 12, Dec. 1977, pp 613-616

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

#### 21 174192

##### **RUBBER-TYRED MOBILES ENCROACH ON PORTAL CRANE MARKET**

The increasing acceptance of mobile cranes as mainline equipment threatens the dominance of rail-mounted installations for ship-to-shore operations in small and medium-sized ports. Even in high throughput terminals, heavy duty mobiles are achieving utilization figures in excess of 2000 hrs/yr--mostly on the quayside--and considerably reduced periods of amortisation.

*Cargo Systems International* Vol. 4 No. 11, Nov. 1977, 3 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

#### 21 174197

##### **FREIGHT CAR FORECASTING MODEL (FCFM)**

This computer program is used for fleet planning. It will handle up to 29 commodities and 39 car types. With a given fleet capacity, it can determine the tons or carloads which can be handled. With a given traffic forecast, it can determine the required car fleet. It can determine sensitivity to a car utilization forecast and to the usage of foreign cars. With given priorities and total capacity, car repair programs can be established. A simple algorithm handles car redistribution when car shortages occur.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174198

##### **CAR DAY IMPROVEMENT MODEL**

This computer program can analyze nearly all types of car movements: Local, received, forwarded, overhead, empty, loaded, pool and non-pool by car type. It can evaluate the effect of various programs to improve utilization. It can also address variances in mileage and per diem costs as a result of changed cycle times. This program is used to develop inputs for the Freight Car Forecasting Model program. It is written in APL.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174200

##### **TRAIN CREW CONSIST MODEL**

This computer will accommodate the following variables: Given an attrition rate determine the blanking scheduling; given bidding practices and labor availability determine optimum assignments; determine the radio expense for blanked crews; determine trust-fund contribution schedule; determine the economic impact of alternate crew agreement schedules. The approach is a Monte Carlo simulation with a 2-week time interval which corresponds to bi-weekly bidding. Crews work jobs during two weeks with non-retirement attrition and absences determined stochastically and retirement based on date of entering service. Model includes an analysis program to aid in interpreting results.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174201

##### **LABOR COST FORECASTING MODEL**

This computer program determines the economic impact of alternative salary and cost-of-living-adjustment schedules. Given various forecasts of

manpower requirements, it can forecast increases in total trainmen and enginemen labor costs. This model can be driven by the Train Crew Consist Model.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174202

##### **TRANSPORTATION LABOR COST FUNCTION**

This computer program evaluates alternatives in dual basis of pay, determining trainmen and enginemen expense as a function of train speed, train size and length of run for individual trains, pools or at the system level. Equations describing actual pay components are programmed in Fortran. Primary input is a statistical cross-tabulation matrix of miles and hours developed from payroll history.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174203

##### **DEADHEAD EXPENSE MODEL**

This computer program evaluates alternative deadheading rules. Application has been limited to a special analysis because sufficient data is not captured on a continuing basis to allow evaluation of each deadheading rule on a system-wide basis.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174207

##### **NETWORK ANALYSIS PROGRAM**

This computer program determines operating impacts of alternative blocking and scheduling policies and of various train lengths. It will also permit development of transportation contingency plans and evaluate network effects of proposed additions and improvements. The program requires the user to develop a blocking and scheduling strategy as input. Traffic is developed using the design day concept. The program moves traffic according to strategy and tabulates the result. This program was developed by SRI and is written in CDC Fortran. Conrail's version is a source code conversion to IBM Fortran. Selected user enhancements have been added.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

#### 21 174208

##### **HUMP YARD MODEL**

This computer program determines facilities and resources necessary to operate a hump yard based on inputted traffic and schedules. It also determines the impact on yard operations of the Network Analysis Program scenarios. The original program as developed by USRA has been expanded to account for interference at pull-out end of yard. Hump yard traffic can be inputted via direct computer interface with Network Analysis Program.

Direct requests to Director, Planning Support Group, Consolidated Rail Corporation.

Consolidated Rail Corporation Apr. 1978, n.p.

ACKNOWLEDGMENT: Consolidated Rail Corporation  
ORDER FROM: Consolidated Rail Corporation, 1434 Six Penn Center Plaza, Philadelphia, Pennsylvania, 19104

21 174209

## CARS/YARDS SIMULATION MODEL

The purpose of the computer program is to support Operating and Traffic personnel in developing and analyzing Operating Plans and analyzing the effects of different traffic demands on operations and service. It is a car-scheduling-oriented model that simulates the scheduling and movement of historical traffic through a user-specified network. Both the operating plan and historical traffic can easily be modified by the user. The model generates a broad range of system/service performance measures. The model is a large-scale Monte Carlo simulation model and uses a regression analysis routine to simulate cars making and missing scheduled moves.

Direct requests to Assistant Director, Information and Control Systems, Missouri Pacific Railroad Company.

Missouri Pacific Railroad Company Mar. 1978, n.p.

ACKNOWLEDGMENT: Missouri Pacific Railroad

ORDER FROM: Missouri Pacific Railroad Company, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri, 63103

21 174211

## DISPATCH LABORATORY

This computer program is an interactive simulation of a CTC system. It consists of an events simulation module and a CTC management module. The events simulation drives such events as train movements, switch and signal responses, and maintenance crew activities. Voice communications are simulated on a CRT with printed messages and message masks for dispatcher responses. The management subsystem provides track displays, train presence indications, switch and signal settings on 2 color CRTs. Another color CRT is used for CTC control board interaction. The system is designed to replicate actual CTC installations. This system is the first phase of a project to develop computer assisted dispatch aids. Later phases of the project include modeling train meets and passes to develop optimal dispatching.

Direct requests to Director, Operations Research, Southern Railway.

Southern Railway System No Date, n.p.

ACKNOWLEDGMENT: Southern Railway System

ORDER FROM: Southern Railway System, 125 Spring Street, SW, Atlanta, Georgia, 30303

21 174212

## CREW ASSIGNMENT MODEL

This model simulates crew assignment policies between 2 terminals. It measures the cost effectiveness of different assignment policies by costing lost trips, deadheads and detentions. The user premises crew starting times, crew set sizes, assignment periods, length of rest periods and other aspects of assignment policies. Train origination and runtimes are determined by Monte Carlo sampling. This model has been used in an interseniority district where number of miles is allocated disproportionately between two local union groups.

Direct requests to Direct, Operations Research, Southern Railway.

Southern Railway System No Date, n.p.

ACKNOWLEDGMENT: Southern Railway System

ORDER FROM: Southern Railway System, 125 Spring Street, SW, Atlanta, Georgia, 30303

21 174214

## CN EMPTY FLOW MODEL

Given a forecast of loaded car movements for some future year, this computer program predicts the induced empty car traffic for the many origin/destination pairs of the CN network. In this gravity model, the number of empty trips between an origin and a destination is assumed to be proportional to the cost on arcs, the production at origins, and the attraction at destinations. The Furness procedure is used as a basic tool for the calibration and the prediction phases.

Direct requests to Manager, Operational Research, Canadian National Railways.

Canadian National Railways Mar. 1978, n.p.

ACKNOWLEDGMENT: Canadian National Railways

ORDER FROM: Canadian National Railways, P.O. Box 8100, Montreal, Quebec H3C 3N4, Canada

21 174216

## CN TERMINAL SWITCHING COST PROGRAM

A significant percentage of the costs associated with moving a car result from industrial switching and transfer activities. By using switching standards and analysis of the movements of industrial switching engines, a set of computer programs assign the share of switching costs borne by each car. A year's sample of switching movements was used to establish average switching times per car for each of approximately 200 industrial sidings. These average switching times are used by the switching cost programs to generate switching costs for specified siding-to-siding moves.

Direct requests to Manager, Operational Research, Canadian National Railways.

Canadian National Railways Mar. 1978, n.p.

ACKNOWLEDGMENT: Canadian National Railways

ORDER FROM: Canadian National Railways, P.O. Box 8100, Montreal, Quebec H3C 3N4, Canada

21 174344

## STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. THE ROLE OF SCREENING MODELS IN EVALUATING RAILROAD RATIONALIZATION PROPOSALS

With so many possible ways to improve rail systems, it is impossible to study them all in a realistic manner. Hence, it is necessary to choose a few possibilities for careful analysis. Simple models of operations, service, and costs can be used to ensure that the most promising possibilities are actually chosen for in depth analysis. These models need not be precise; they need only screen out reasonable possibilities from unreasonable ones. This report presents a number of screening models of rail operations and service. These models can be used immediately by anyone familiar with rail operations. The models can also be used as educational tools. Several program listings for hand calculators are included to promote use of these models. The report also includes conclusions regarding the most effective ways to improve the rail transportation system.

Prepared for the Program of University Research of the U.S. Department of Transportation.

Martland, CD Assarabowski, R McCarren, JR

Massachusetts Institute of Technology Final Rpt. Vol. 21 MIT-R77-13, Apr. 1977, 131 pp, 17 Fig., 23 Tab., 2 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

ORDER FROM: Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139

DOTL RP

21 174360

## RAIL AND BARGE TRANSPORTATION OR THE REVERSAL OF THE WINNING OF THE WEST

Cajun Electric Power Cooperative, Inc. plans to buy low sulfur coal in Montana, ship it by unit train to St. Louis, Mo and then by barge to New Roads (near Baton Rouge), Louisiana, to a new power plant involving two-540-megawatt units are outlined. The cost of the project is more than 600 million dollars and it is scheduled to be in operation as follows: Unit No. 1, July 1979; and Unit No. 2, July 1980.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Smith, C

PLM, Incorporated Conf Paper 1977, pp 231-236

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

21 174361

## COAL PRODUCTION AND TRANSPORTATION

Establishing a unit train operation requires input from the shipper, receiver, and the railroad. The shipper must furnish his loading capability, including limitations, to determine the amount of time required for loading. The receiver should supply the unloading conditions as well as the annual volume to be moved. With this information the transportation department determines the transit time, and adds the time required for loading and unloading which provides the cycle time. The number of cars required and train size are then determined, based upon the cycle times and annual volume to be moved, bearing in mind that the optimum train is the maximum number of cars in each train that will remain active in a continuous cycle (MOPAC

maximum is 110 cars). The operating parameters are furnished to the cost department to develop the cost of operation. The parameters and costs are then forwarded to the pricing department for determining the freight rate to be published. Coal unit train rates are unique in that each movement is based upon the cost factors that apply to the specific movement. There are no relationships between movements. Each unit train system is developed and priced on its own circumstances. In order to insure feasibility in a unit train operation, the transportation department utilizes train performance simulators to measure accurately such things as locomotive and fuel requirements, draw bar stress, train speeds, running time schedules, and maximum train size, so that a real-time efficient operation is worked out and made ready for implementation. The one requirement necessary to justify a unit train operation is that annual volume must be sufficient to keep the equipment in a continuous cycle; otherwise, the economics of this method of transporting coal are lost.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Stanislaus, JL

PLM, Incorporated Conf Paper 1977, pp 223-229

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

## 21 174362

### UNION PACIFIC'S PLANS FOR COAL TRANSPORTATION

Probably two of the most critical factors affecting energy resource development are the large front-end investments and the long lead times required by energy-related projects. A third critical factor is the task of planning and executing these projects in a changing and uncertain environment. The creation and decisions of the new Department of Energy will have a major impact on the production and transportation of coal. Other public issues facing the coal industry today include the direction of the "reform" of the nation's electric utility industry; pollution problems and amendments to the Clean Air Act; strip mine legislation; the future of slurry pipelines; and the ability of the nation's railroads to transport an ever increasing amount of coal production. Union Pacific's plans for increased transport of coal are outlined: new cars and locomotives, new rails, track maintenance, centralized traffic control and construction of new coal cars (some of the Teoli type) in their own shops. In response to questions, the author says they can build coal cars cheaper than buy them (partly due to steady operation and a flat overhead) and objects to slurry pipelines because they compete for the high volume traffic the railroad handles best and leave the railroad to haul smaller volumes and functioning to some extent on a standby basis.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Kenefick, JC

PLM, Incorporated Conf Paper 1977, pp 211-220

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

## 21 174363

### OKLAHOMA GAS AND ELECTRIC'S EXPERIENCE WITH UNIT TRAIN OPERATIONS

The initiation of unit train operations was marred by a few equipment failures and accidents which are detailed. Some of the equipment failures led to unexpected behavior that caused damage to the installation. The turn-around time of 118 hours initially suggested by the railroads has not yet been met and the average time after 83 trains is 158 hours.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Gibbons, GL

PLM, Incorporated Conf Paper 1977, pp 203-208

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

## 21 174371

### HOW BURLINGTON NORTHERN WILL TRANSPORT WESTERN COAL

Burlington Northern is a 25,000 mile railway system that serves some 4,000 communities in 19 states and two provinces of Canada. That service territory

stretches from Chicago and the Great Lakes to the ports of the Pacific Northwest, and south from Canada to the ports on the Gulf of Mexico. In between, our tracks wrap around the vast coal fields of Montana, Wyoming, and North Dakota. Some 70 percent of all American coal is located west of the Mississippi, and the states of Montana, Wyoming, and North Dakota have about 44 percent of the total. Of real significance is the fact that a large percentage of those reserves are surface-mineable, low-sulphur deposits. Burlington Northern's experience with unit coal trains is reviewed. Capital and maintenance programs from 1970 through 1981 involves nearly 3 billion dollars and are largely coal-related (centralized traffic controls, longer sidings, new trackage, etc.). Further, coal producers and electric power plants have constructed special loading and unloading facilities to reduce turn around time. Railroads can handle the expected coal traffic and serve their other customers as well: they need the extra business to improve their return on capital invested. But if any significant number of the 15 new coal slurry pipelines are built the effects on railroads and on their customers could be devastating.

In Coal production and transportation: third annual conference, 1977; San Francisco, PLM, Inc.

Lorentzen, NM

PLM, Incorporated Conf Paper 1977, pp 49-60

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: PLM, Incorporated, 1 Embarcadero Center, San Francisco, California, 94111

## 21 175273

### POTENTIAL ECONOMIES AND IMPROVEMENTS IN PERFORMANCE RESULTING FROM IMPROVEMENTS IN RAILROAD TERMINAL OPERATIONS

The report presents the findings from four case studies to identify potential economies and improvements in performance that result from better terminal operations. Presented are methodologies employed to examine crew scheduling, car flow, hump yards, supporting activities, and costs. Specific findings on potential crew and car flow reductions from the four studies are used as a base point for estimating the national implications of implementation of short term, straight forward improvements. A brief examination of alternatives to railroad pickup and delivery is presented through these case studies.

Hoppe, CW Hart, WM

Booz-Allen and Hamilton, Incorporated, Federal Railroad Administration  
Final Rpt. FRA/OPPD-78/4, Nov. 1977, 208 pp

Contract DOT-FR-75242

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277445/3ST, DOTL NTIS

## 21 176035

### FREIGHT CAR UTILIZATION AND RAILROAD RELIABILITY: CASE STUDIES

Freight car utilization and service reliability have become increasingly important issues for the railroading industry. Rapidly rising costs of new equipment and increased interest rates have combined to force the railroads to look towards improved utilization as a means of reducing future car acquisition requirements. The report investigates the relationship between utilization and reliability through the use of a series of case studies undertaken in cooperation with 11 railroads. These studies range from analyzing a new operating strategy to analyzing the effect of a new car cleaning facility. The case study reports provide information on the problem, proposed solutions, the analysis performed, and conclusions reached. The summary draws conclusions from the case studies in the areas of performance evaluation and service design within railroad companies. Further, the summary makes several recommendations as to how railroads might obtain improved utilization and reliability.

Association of American Railroads, Federal Railroad Administration  
Final Rpt. FRA/OPPD-78/10, AAR-R-283, Oct. 1977, 398 pp

Contract DOT-FR-65146

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-279642/3ST

21 176708

## SCIENTIFIC STUDY FOR DETERMINATION OF OPTIMUM TRAFFIC FLOW DENSITY [Effektivnye metody uskorenogo prodvizheniya vagonopotokov]

The authors, using experience and forecasts for freight traffic, analyse the parameters for determination of the optimum possibilities for forwarding, regulation and management of a particular railway's rolling stock. The method advocated is applied, by way of illustration, to traffic on a section of the Trans-Siberian Railway. [Russian]

Cernjugov, AD Nekrasevic, VI *Zheleznodorozhnyi Transport* No. 11, 1977, pp 50-57, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ministerstvo Putei Soobshcheniya SSSR, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

21 178212

## SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEMS--PHASE I, EXPLORATORY PLANNING VOLUME I--EXECUTIVE SUMMARIES

An overview of the findings of the initial phase of the Federal Railroad Administration's (FRA) Intermodal Systems Engineering Program is presented. The work reported presents one segment of FRA sponsored research and development directed to the improvement and viability of rail freight service. Phase I, Exploratory Planning, Systems Engineering for Intermodal Freight Systems, briefly stated, included: (1) characterization of present intermodal equipment and operations; (2) identification of problems or opportunities where technology could be utilized to improve service, efficiency and return on investment; (3) identification of improved equipment, subsystem, facility concepts having potential future application; (4) synthesis of alternate systems comprised of improved equipment in various combinations; (5) development of a methodology for assessment of the relative merit of system alternatives in quantitative terms under various operating scenarios; and (6) evaluation of synthesized systems and identification of most promising alternatives. The work reported was performed by two contractor teams working independently, each using slightly different approaches. Each contractor interacted with intermodal committees of the Association of American Railroads, the Transportation Research Board, and the National Industrial Traffic League. The findings from Phase I will be used in a more in-depth examination of the most promising alternatives during Phase II, Development Planning.

Volumes VI through V to be published June 1978.

Kearney (AT) and Company Incorporated, Peat, Marwick, Mitchell and Company Final Rpt. FRA/ORD-78/24.I, Apr. 1978, 77 pp

Contract DOT-FR-748-4336

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-282370/AS, DOTL NTIS, DOTL RP

21 178287

## CONTAINER SPREADERS ON BRITISH RAIL

This paper describes briefly the development of the freightliner system with particular reference to the concept of the Goliath crane/spreader frame combination. Designs are given and certain design features and modifications are explained in the light of experience gained with earlier designs.

Robinson, PJ *Rail International* Vol. 9 No. 3, Mar. 1978, pp 154-160, 2 Fig., 2 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

21 178488

## RUBBER-TIRED VERSUS RAIL HAULAGE AS A SERVICE FUNCTION

An analysis was conducted for a proposed Illinois mine. The factors considered were operating capabilities, capital investment, operating costs (including labor), tax considerations, cost of capital and various intangible factors. Mantrip costs and speeds were determined to be equal in both systems. The model for this study was a shaft mine projected to produce 12,000 tpd (raw) by room and pillar methods in a 6-ft seam. Panels were to be 750 ft wide by 4,000 ft deep. Average grade would be 0.5% against the loads.

Dwosh, DM (Inland Steel and Coal Company) *Mining Congress Journal* Vol. 64 No. 1, Jan. 1978, 6 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

21 178496

## MEN AND MATERIALS HANDLING IN 1100 OREBODY OF MOUNT ISA MINES LIMITED

The 1100 Orebody is the main copper production area of Isa Mines in Queensland, Australia, with an output of 390,000 tonnes per four week period and a work force of approximately 260 men per shift. Currently a total of 56 nippers work a three shift, five day week roster to service crews spread over a strike length of 1000 m and a vertical height of 220 m. A variety of rail and diesel equipment provides shaft to cribroom and cribroom to sublevel work place transport of men and materials. Overall efficiency and safety has been improved with a selected group performing supply, storage, clean-up and "bus runs" throughout the orebody--activities which are further coordinated by an FM radio system linking units with a control clerk.

Bates, JR (Mount Isa Mines, Limited, Australia); Kennedy, BJ *Australasian Institute of Mining and Metallurgy Symp Ser n 17, 1977, pp 141-145*

ACKNOWLEDGMENT: EI  
ORDER FROM: Australasian Institute of Mining and Metallurgy, Clunies Ross House, 191 Royal Parade, Parkville, Victoria 3052, Australia

21 178688

## SHUNTING WAGONS WITH A MINIMUM OF EFFORT [Das Rangieren durch Umsetzen mit dem geringsten Aufwand]

Every day at stations without a humping yard a mixture of goods wagons are shunted about with train or shunting locomotives until wagon groups for common destinations and in a predetermined order are obtained. In order to obtain the required order there are usually several, and often many possibilities with respect to extent and sequence of the shunting movements, and these differ substantially in the effort involved. Finding the shunting programme required to make up a wagon group in the shortest time and with the least effort exceeds human capacity even when only a few wagons are to be classified, so that the optimal shunting programme cannot be found with certainty. A mathematical solution to the problem has not so far been found. The optimal solution in each case can be found, however, with the aid of EDP, for this allows an indeterminate number of alternatives to be compared. The author describes the requirements for the selection of reasonable alternatives and presents a notional classification diagram as basis of programming for finding the optimal solution. The method is illustrated by means of two examples. [German]

Also published in English, French and Spanish.

Zehme, I *Eisenbahntechnische Rundschau* Apr. 1978, pp 205-208

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

21 178948

## SERVICE IS GOLDEN

The Slingshot piggyback service of Illinois Central Gulf is capturing profitable business from the highways in a short-haul market long held to be unprofitable for railroads. These 15-car trains operate with a 2-man crew and no caboose on a 280-mile route from Chicago to St. Louis 3 times daily in each direction. This marketing package has received the Golden Freight Car Award for 1978.

Roberts, R *Modern Railroads/Rail Transit* Vol. 33 No. 6, June 1978, pp 44-47, 2 Phot.

ORDER FROM: ESL

DOTL JC

21 179113

## USE OF COMPUTER SIMULATION FOR THE ANALYSIS OF RAILROAD OPERATIONS IN THE ST. LOUIS TERMINAL AREA

This report discusses the computer simulation methodology, its uses and limitations, and its applicability to the analysis of alternative railroad terminal restructuring plans. Included is a detailed discussion of the AAR

Simulation System, an overview of twelve other railroad simulations, and an analysis of how they or other simulation systems might aid the restructuring project being conducted by the railroads in St. Louis. Included is critical analysis of what "validation" of simulation means and what it does and does not imply. Also discussed is the meaning of the terms "network" (as in network simulation) and "levels of detail." Simulation builders and rail-roaders view these terms differently, which often results in disappointment with the results of supposedly "successful" simulation ventures. The importance of user familiarity with both the simulation system and railroad problems is stressed. A major conclusion reached is that none of the existing network simulations is suitable for detailed analysis of railroad terminal areas. Development of a simulation system incorporating a new approach for performing such analysis is within the state-of-the-art and is recommended.

Merriam, EW

Bolt, Beranek and Newman, Incorporated Final Rpt. DOT-TSC-FRA-77-25, Nov. 1977, 80 pp

Contract DOT-TSC-13305

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

#### 21 179146

##### CONSIDERATIONS ON THE SIMULATION OF TRAIN MOVEMENTS IN RAILWAY NODES [Betrachtungen zur Simulation des Betriebsablaufs in Eisenbahnknoten]

Construction of a simulation model for the study of train movements in a small railway node. Description of how the process operates and the method of work of the model. Possibilities of application in relation to the degree of development reached up to the present. Results giving indications on the state, occupation time and degree of use of the processed data (routes, station tracks, block section, etc.). [German]

Hentsche, H *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 24 No. 4, 1977, pp 831-838, 5 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

#### 21 179147

##### COMPILING TIMETABLES BY DATA PROCESSING METHODS [Fahrplanberechnung mit EDVA]

Model used for working out timetables. Description of the algorithm, which uses several descriptive files of tracks and trains, and which under certain conditions indicates a possible solution. Details of how the calculations are carried out. Use of the results of tests. [German]

Seifert, KH Vetter, H *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 24 No. 4, 1977, pp 785-790, 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

#### 21 179149

##### THE EFFICACY OF INCREASING THROUGHPUT AND FORWARDING CAPACITY [Die Wirksamkeit der Verstaerkung der Durchlass-und Befoerderungsfahigkeit]

The author discusses increasing freight transport capacity by raising the net tonnage of trains or by running more trains, with its possibilities and limits;

increasing throughput by raising speeds and replacing diesel locomotives by electric ones; the influence of the automatic block. Conclusions for single-track and double-track lines. [German]

Tschernomordik, GI *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 24 No. 4, 1977, pp 623-631, 1 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

#### 21 179162

##### CONTAINER LANDBRIDGES AND MINIBRIDGES

This article defines the terms "minibridge" and "landbridge", and reviews world container traffic by combined land and sea transport. A "landbridge" is the intermediate or land part of a journey on a sea-land-sea route, whereas a "minibridge" is the initial or terminal journey on a sea-land or land-sea route.

Boyes, JRC *Modern Transport* No. 1, 1978, pp 13-18, 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Massachusetts Motor Truck Association Incorporated, 262 Washington Street, Boston, Massachusetts, 02108

#### 21 179525

##### ASPECTS OF COMBINED GOODS TRANSPORT IN AUSTRIA

##### [Aspekte zum Kombinierten Gueterverkehr in Oesterreich]

This paper analyzes the significant characteristics of combined road and rail goods traffic and its economic importance for road and rail systems. Because of the relatively short distances involved the basic conditions in Austria are not particularly favourable. But for export and transit traffic there are greater possibilities for development, given the appropriate economic and political basis, especially in the case of road-railer traffic. The loss-making piece goods traffic of the railways could be rationalized by proper co-ordination between road and rail and by establishing a junction network on the west German model. Altogether combined traffic offers possibilities of rationalizing the transport economy and an aid to the modernization of the railways. [German]

Kohlhauser, W *Wifo-Monatsberichte* Vol. 50 No. 4, Apr. 1977, pp 209-213

ACKNOWLEDGMENT: TRRL (IRRD 306592)

ORDER FROM: Verein Oesterreichisches Inst f Wirtschaftsforsch, Postfach 91, Vienna, Austria

#### 21 179984

##### MATHEMATICAL ANALYSIS OF A TWO-SHUTTLE TRANSPORTATION SYSTEM

A mathematical analysis of a two-shuttle system, using car ferries as the example, is formulated as an interdependent queueing system. The main features of the model include a fixed ferry travel time, a single dock on each side, stochastic (Poisson) car arrivals and infinitely large parking lots. Equations are derived to describe the behavior of the system, namely: equations of the number of cars waiting at both ferry docks, times for the two ferries to reach the next docking at appropriate clock times, number of cars on and boarding the ferries, and waiting times of the ferries.

Bekiroglu, H (Southern Illinois University, Edwardsville) *Zeitschrift fuer Operations Research* Vol. 21 No. 6, Serie B: Praxis, Dec. 1977, pp 219-227, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL



22 169018

## CONCEPTUAL DESIGN REPORT FOR HETP RADIOACTIVE FEED MATERIAL SHIPPING EQUIPMENT

The continuing development of the HTGR fuel reprocessing flowsheet requires demonstration of selected processes in a highly radioactive environment. The Hot Engineering Test Project (HETP) has been designated for this purpose. Irradiated Fort St. Vrain fuel has been selected as the primary "hot" feed material for this program. This requirement establishes the need for licensed shipping equipment to transport the feed material between the storage facility in Idaho to the Hot Engineering Test Facility (HETF) sited at ORNL. This report documents the conceptual design studies which have been performed to define the shipping equipment and identify requirements for equipment and interfaces at the support facilities. (ERA citation 02:045143)

Burgoyne, RM Steeger, EJ

General Atomic Company, Energy Research and Development Administration Apr. 1977, 85 pp

Contract EY-76-C-03-0167-PRJ- (53)

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

GA-14353

22 169071

## A COMPREHENSIVE MARINE TRANSPORTATION SYSTEM FOR THE DELAWARE VALLEY REGION: A CASE STUDY

A marine transportation system especially applicable to Delaware Bay is presented. The central component is a man-made island that serves as a deepwater port. Components of the system include an air-sea cargo center, a trestle corridor connecting the cargo center to the island, a restricted access rail and highway corridor to up-state connections, a deepwater channel to the ocean, and provision for submarine pipeline access from outer continental shelf oil and gas fields, if these materialize. The objectives of the system are: first to provide the deepwater docking facilities required by modern, large economical ships; second to stimulate economic growth within Delaware and the surrounding region; third to increase the safety of marine transportation; fourth to develop a commercial center adjacent to Dover Air Force Base as an alternative to military use; and fifth to demonstrate Delaware's commitment to the future regional needs for transportation and energy within the existing environmental preservation standards.

Murray, JJ Tupin, EA Golt, CM Dey, ND Tremaine, RL Delaware University, Newark, National Oceanic and Atmospheric Administration DEL-SG-12-77, NOAA-77091601, May 1977, 185 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273058/8ST

22 172632

## THE INVENTORY-TRANSPORT MODEL WITH SENSITIVITY ANALYSIS BY INDIFFERENCE CURVES

For a total cost model the typical inventory model can be easily extended to include relevant transport factors with a sensitivity analysis. The analysis provides the shipper with a cost structure and indicates the basis for negotiating with carriers. An awareness by the carrier that the shipper analyzes the inventory-transport decision should make carrier management more sensitive to the impact of pricing and service strategies.

Buffa, FP (Texas A&M University); Reynolds, JI *Transportation Journal* Vol. 17 No. 2, Dec. 1977, pp 83-90, 4 Fig., 2 Tab., 9 Ref.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

22 172670

## CALCULATION OF THE TIME OF FLOW OF A FILM OF A VISCOUS PETROLEUM PRODUCT FROM THE INNER SURFACE OF RAILROAD TANK-CARS [Raschet vremeni stekaniya plenkiyazkogo nefteprodukta s vnutrennei poverkhnosti kotlov transportnykh tsistern]

Analytical relations are presented for the calculation of the time of flow of a set proportion of the petroleum product contained in the residual film from the inner surface of the drum of a tank-car. This time corresponds to the time of delay of the tank-car for emptying after the bulk of the petroleum product is discharged, in order to reduce the losses of the petroleum product due to

incomplete emptying. An example of calculation of the time of flow of a film is presented. [Russian]

Lur'ev, MV (Moscow Inst Petrochem & Gas Ind im. I.M., Gubkin) *Izvestiya Vysshikh Uchebnykh Zavedenii, Neft Gaz* No. 4, 1977, pp 77-80

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 173156

## NUMERICAL STUDY OF THE SURFACE THAWING OF COAL CARS

Wide-scale transportation of coal by rail from mines in Northern regions of the continent is likely to be undertaken in the future. During winter the moisture in the coal tends to freeze causing the coal to adhere to the surface of the car making it difficult to discharge the coal from the car. The most common method used to break the bond between the frozen coal and the car surface is to pass the cars through a thaw-shed in which they are exposed to infrared heaters. Some aspects of the thawing in such sheds have been numerically investigated using a relatively simple one-dimensional finite-difference type solution of the governing equations. The effects of the governing parameters on the degree of thawing have been investigated and some conclusions regarding thaw-shed design have been reached.

Paper for Meeting, November 27--December 2, 1977.

Oosthuizen, PH (Queen's University, Canada)

American Society of Mechanical Engineers n 77-WA/HT-33, 1977, 9 pp, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 173166

## KEEP CONTAINERS IN MIND

ISO (International Standards Organization) containers offer many advantages when shipping goods overseas. By taking their dimensions into consideration at an early stage, designers can often simplify the shipment of large and heavy plant--and save on transport costs. The types particularly pertinent to the efficient carriage of machinery and plant are those which fall into Group 1 (General Cargo Containers) of ISO Recommendation R 1894 which gives the minimum internal dimensions which this article gives in a tabulation. To these dimensions there are the following exceptions: Containers having partial opening(s) in the side(s) should comply with the minimum length and height; containers having an opening roof should comply with the minimum internal length and width; containers having openings in the side(s) and/or roof should comply with the minimum internal length. Even oversize and overweight cargo up to 290 cm wide by 366 cm high can be containerized providing agreement of the Container Operator is first obtained and the cargo can be physically and legally handled by any land transport means required. Further, if the designers of a machine know in advance that it will be shipped by container, they can often modify the design and/or disassembly features to reduce costs.

Huntley, JE *Engineering (London)* Vol. 217 No. 3, Mar. 1977, pp 204-206

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 173585

## FLEXIBILITY IS KEY IN OPERATIONS AT PARAMOUNT PLANT

Paramount Minerals Corp's. coal preparation plant, expected to be in operation by the year-end is highlighted here. Designed to receive coal feed from at least three different sources, the plant will be able to load raw or washed coal on two separate rail lines or, if preferred, simultaneously to load raw coal on one track, washed coal on another track and washed coal from two silos on a third track. Flow sheet for the fine coal preparation facilities is presented.

Arble, M *Coal Age* Vol. 82 No. 11, Nov. 1977, pp 76-79

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 173586

## WE CAN HANDLE IT

Capability of American railroads to provide ample capacity for handling expanded coal production is briefly examined in the light of two studies, one private, the other governmental, which widely differ on the subject. Railroad

officials, supported by a Department of Transportation (DOT) study, claim they can add more capacity as new coal mines and power plants go onstream. Figures concerning the production and delivery time of cars, locomotives and rail are given to help shed some light on the controversy.

Shaffer, FE *Coal Mining and Processing* Vol. 14 No. 7, July 1977, 5 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 22 174188

### CHANGING PATTERN OF DISTRIBUTION

A definition is given of what changes have occurred within the domestic distribution system. Identification is made of reasons for these changes. Future developments within the marketing channel structure are identified. The methods by which management could achieve change with the distribution function are identified and an outline is given of the problems which may be encountered in the process.

Slater, AG (Lanchester Polytech, England) *Long Range Planning* No. 7, July 1977, pp 29-41, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 22 174215

### CN WAREHOUSE STORAGE DESIGN MODELS

A set of computer programs provides the warehouse designer with information necessary for optimization of material storage and retrieval in proposed warehouse layouts. The programs use input from existing stock item files and the designer's storage specifications to calculate the quantity required of each storage mode and size. Given further data from the designer on the proposed warehouse layout, the programs produce specific item location addresses according to each item's volume and frequency of demand.

Direct requests to Manager, Operational Research, Canadian National Railways.

Canadian National Railways Mar. 1978, n.p.

ACKNOWLEDGMENT: Canadian National Railways  
ORDER FROM: Canadian National Railways, P.O. Box 8100, Montreal, Quebec H3C 3N4, Canada

## 22 174352

### MODELS OF TRAVEL TIME AND RELIABILITY FOR FREIGHT TRANSPORT

This study identifies the causes of delay and unreliability in transport systems and models them in such a way that complete trip time distributions can be obtained. The tradeoff between trip time and rates almost always figures importantly in the choice of mode and shipment size. It is difficult to get good estimate of trip time; multiple observations must be used to get a distribution of travel time which describes not only the average performance of the mode but also its reliability. The attributes of each system are related directly to elements of the mathematical model in order to produce a tool which can easily be used for planning and policy analysis.

Prepared for the Federal Energy Administration Office of Transportation Policy Research.

Terziev, MN Roberts, PO  
Massachusetts Institute of Technology CTS-76-16, Dec. 1976, 29 pp, 6 Fig., 2 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

## 22 174386

### LONDON REACHES OUT TO DISPOSAL SITES WITH MAJOR RAILHAUL PROJECT

The British capital is about to become the first large metropolitan area in the world to rely on long distance railhaul for the disposal of a major part of its wastes stream. The Greater London Council (GLC), responsible to more than 7-million residents, has decided to construct three rail transfer stations. The facilities will transport 24 percent of the city's solid wastes to landfill sites beyond the county boundaries. Collectively, these will eventually handle up to 2400 tons of wastes per working day. Two of the transfer

stations will be financed and built by the council and operated by the Public Health Engineering Department. In order to keep a balance and measure of competition between public and private sector operations, the council invited bids for the third project to include the provision of a complete railhaul disposal operation-- the successful bidder to finance, build and operate the transfer station on a selected site, arrange railhaul, and provide and operate a landfill. All three systems are based on the same principle-- compaction of the wastes at the transfer stations into containers meeting the international I.S.O. standards; loading the containers on to flat rail cars; off-loading at the landfill site railhead on to truck chassis for discharge at the landfill's working face.

Patrick, PK (Greater London Council) *Solid Wastes Management/Refuse Removal Journal* Vol. 20 No. 8, Aug. 1977, 3 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 22 177156

### A PRELIMINARY ANALYSIS OF FACTORS AFFECTING MODAL SELECTION FOR THE MOVEMENT OF WESTERN CANADIAN COAL TO ONTARIO

The problem of selecting the appropriate mode or combination of transportation modes for the movement of Western Canadian coal to Ontario through the year 2000 is studied. This analysis includes the development of coal demand and supply forecasts, and an assessment of rail traffic and line capacity in Western Canada. Marginal capital and operating costs for four alternative systems--rail/lakeboat, slurry pipeline/lakeboat, high-voltage direct-current transmission, and coal gasification--are developed, and tariff schedules for each system through 2000 calculated using a discounted cash flow computer model. A sensitivity analysis on the model parameters and cost estimates is performed.

Boon, CJ  
Canadian Institute of Guided Ground Transport Final Rpt.  
CIGGT-78-6, Apr. 1978, 148 pp, Figs., Tabs., 2 App.

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

## 22 178157

### ORE TRAFFIC IN NORTH SWEDEN [Erzverkehr in Nordschweden]

Information in North Sweden and Narvik on the methods employed to solve the handling problems at temperatures above and below freezing point is presented. The methods of ore dressing, the design and loading and unloading of the rail vehicles, and the handling equipment at the shipping ports of Lulea and Narvik are described. [German]

Lange, K Pfaar, E *Glaser's Annalen ZEV* Vol. 101 No. 12, Dec. 1977, pp 471-47

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 22 179266

### EXPLORATORY STUDY OF ADAPTING OR DEVELOPING COLLAPSIBLE CONTAINERS AND INTER-LINERS FOR USE IN SPECIALIZED RAIL AND BARGE EQUIPMENT

A significant portion of rail and barge transportation energy is consumed unproductively in freight operations through the necessity of making empty backhauls. In 1975 the transport of empty railcars accounted for more than 45 percent of the total freight car-miles and nearly 25 percent of the gross ton-miles. Despite economic and energy penalties, empty car mileage has increased in recent years. Clearly, a reduction in empty railcar and barge mileage could lead to significant reductions in rail and barge energy consumption. This report represents the results of an exploratory investigation into the use of collapsible containers and interliners as specialized equipment for railcars and barges as a means of reducing empty backhauls. The report contains potential solutions to the technical and regulatory requirements and the economic problems associated with the use of such containers and interliners. It also contains recommendations on further research including the direction and scope.

Prepared under Purchase Order No. EC-77-X-01-2957, for U.S. Department of Energy, Assistant Secretary for Conservation and Solar Applications, Division of Transportation Energy Conservation.

Snitzler (James R) and Associates, Incorporated HCP/M2957-01 UC-96,  
June 1978, v.p., Tabs., 1 App.

ACKNOWLEDGMENT: Department of Energy  
ORDER FROM: Department of Energy, Division of Transportation Energy  
Conservation, Washington, D.C., 20545

DOTL RP

## 22 179271

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 1--EXECUTIVE SUMMARY

The report describes and analyzes the physical distribution system for fresh fruits and vegetables. Issues and opportunities confronting rail and truck carriers in this market are presented. Combinations of opportunities designed to increase rail market share, increase mechanical refrigerator car utilization, or bring stability to exempt truck rate pricing are analyzed and evaluated. An improved intermodal service with contract rates (under exemption from ICC rate and service regulation) is the best opportunity to increase rail market share. Either an auction market or a clearinghouse would add stability to exempt commodity rate-making for truck carriers. Appendices to the report describe produce packing and shipping in California, Florida, Texas, and Washington; produce distribution in Boston, Cincinnati, Minneapolis, New York, and St. Louis; rail and truck cost and service profiles for produce transportation and rail refrigeration and vehicle technology for transporting fresh fruits and vegetables. See verso for titles of report volumes.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volumes 2-11, RRIS 22 179272-179281 respectively; Bulletin 7802.

Schrier, E Ainsworth, DP  
Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.1, Dec. 1977, 28 pp

Contract DOT-FR-65024

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-283631/AS, DOTL RP

## 22 179272

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 2--GENERAL SUMMARY

Study results are discussed covering (1) an estimate of the consequences of allowing current transportation trends in this industry to continue; (2) descriptions of the logistics system alternatives recommended for producing changes in rail and truck produce transportation; (3) a description of study approach; (4) a description of current handling of perishables by producers and receivers; (5) a description of current rail and truck service, cost, and technology.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Schrier, E Ainsworth, DP Hill, SG Stone, PV  
Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.2, Dec. 1977, 192 pp, Figs., Tabs., 1 App.

Contract DOT-FR-65024

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-283632/AS, DOTL RP

## 22 179273

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 3--A PROFILE OF FRESH FRUIT AND VEGETABLE SHIPMENTS FROM SELECTED GROWING AREAS

In this study, 29 commodity-origin-destination triplets, made up of 7 commodities, 4 origin states and 5 destination cities, were selected for examination as representative of major domestic shipments of fresh fruits and vegetables. The emphasis is on seasonality and size of shipments, volumes shipped, perishability, mode of transport and pricing dynamics. Investigation extends from 1950 to 1975 with emphasis on the last 5 years when the railroad share of produce movements reached a critical level.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See

also Volume 1, RRIS 22 179271; Bulletin 7802.

White, SJ

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.3, Dec. 1977, 171 pp, 19 Fig., Tabs.

Contract DOT-FR-65024

ACKNOWLEDGMENT: FRA  
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## 22 179274

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 4--A PROFILE OF FRESH FRUIT AND VEGETABLE MARKETING AND DISTRIBUTION IN SELECTED DESTINATION CITIES

In this study fresh fruit and vegetable transportation is examined from the standpoint of the destination area receivers. Primary receivers in five eastern and midwestern cities form a basis for analysis, although each area proved to be unique. The types of operators and their importance in the market, characteristics of the commodities each receiver handles, the service and cost of transportation modes serving each area, the population size and growth trends, and the consumer buying patterns all contribute to the picture.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Stone, PV Ainsworth, DP Riker, JB Keale, MJ Isacowitz, DA  
Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.4, Dec. 1977, 197 pp, 54 Fig., 14 Tab.

Contract DOT-FR-65024

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## 22 179275

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 5--FRESH FRUIT AND VEGETABLE TRANSPORTATION SERVICES AND COSTS: TRUCK AND RAIL

This volume documents and analyzes the current status of the rail and highway carriers providing service in the triplet markets and forecasts their potential for future operations. Railroads, which dominated the movement of perishables a quarter century ago, are on the verge of being eliminated from this market. The role has been assumed by a complex of highway operators, not fully understood even by many close to the industry.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Riker, JB Keale, MJ  
Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.5, Dec. 1977, 117 pp

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## 22 179276

### A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 6--TRANSPORTATION EQUIPMENT TECHNOLOGY

This report describes and evaluates refrigerator cars, TOFC vans and containers that handle long-haul produce. It also discusses the problems of this technology and ways in which rail-oriented equipment can be designed to compete with the superior service offered by trucks. Various technical advancement such as articulated frame cars, advanced insulation and refrigeration techniques being used and proposed, and control and monitoring systems are discussed. The final chapter focuses on methods and devices used to protect cargo from physical damage.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Stone, PV Hill, SG

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.6, Dec. 1977, 63 pp, 7 Fig., 4 Tab.

Contract DOT-FR-65024

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#### 22 179277

##### **A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 7-FRESH FRUIT AND VEGETABLE PACKINGHOUSE OPERATIONS AND ECONOMICS**

This report analyzes the handling characteristics and unit costs incurred in the postharvest preparation of fresh fruits and vegetables at the points of origin. Emphasis is on the commodity--its biological nature, physiological requirements, procedures employed in packing for transport, and the volumes handled. The goal is defining the product as it is presented for shipment.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Parker, DJ

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.7, Dec. 1977, 165 pp, 16 Fig., 57 Tab.

Contract DOT-FR-65024

ACKNOWLEDGMENT: FRA  
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PB-283637/AS, DOTL RP

#### 22 179278

##### **A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 8-EVALUATION OF LOGISTICS ALTERNATIVES**

Ten principal issues being on the efficiency and practicality of rail service in distribution of produce are identified. They include institutional issues of government economic regulation and carrier liability for loss and damage; financial issues of equipment ownership, service pricing, shipper commitment and equipment utilization; and technical issues of equipment selection, equipment operation and product mixing. After examining several responses in each of these areas, a careful analysis of seven alternatives was made. Two could be considered for short-term improvement of present operations and three as long-term remedies for basic rail and truck produce transportation problems.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Schrier, E Hill, SG Rifas, BE

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.8, Dec. 1977, 191 pp, 13 Fig., 28 Tab.

Contract DOT-FR-65024

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#### 22 179279

##### **A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 9-FRESH FRUIT AND VEGETABLE COMMODITY/ORIGIN/DESTINATION SELECTION AND DESCRIPTION**

This volume includes a national overview of the production of fresh fruits

and vegetables; an explanation of the rationale behind this study's selection of cases; an analysis of production volume, characteristics and description of marketing practices, distribution channels, transportation alternatives; and the institutional, technological and regulatory problems associated with or influencing these elements.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Cleary, CG Hill, SG

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.9, Dec. 1977, 169 pp, Figs., Tabs.

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#### 22 179280

##### **A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 10-PRODUCE SHIPMENT DESCRIPTION MODEL**

This report describes the data collection effort, the content of the data base which was produced and the format of the resulting shipment description model. The model represents fresh fruits and vegetables traffic as it moved in 1975/1976.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Isacowitz, DA Ainsworth, DP

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.10, Dec. 1977, 79 pp, 8 Fig., 19 Tab., 3 App.

Contract DOT-FR-65024

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#### 22 179281

##### **A LONG-TERM STUDY OF PRODUCE TRANSPORTATION. VOLUME 11-GLOSSARY OF PRODUCE MARKETING AND DISTRIBUTION**

Many terms used in the packing, transportation and marketing of fresh fruits and vegetables are unique to the industries involved. Many more are familiar terms that have acquired special meanings within those industries. This glossary, while not comprehensive, offers definitions for those terms and abbreviations that may prove useful to readers seeking to understand the structure of the perishables industry and the manner in which it operates.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development and National Bureau of Standards, Experimental Technology Incentives Program. See also Volume 1, RRIS 22 179271; Bulletin 7802.

Hill, SG Keale, MJ

Manalytics, Incorporated Final Rpt. FRA-OPPD-78-2.11, Dec. 1977, 24 pp

Contract DOT-FR-65024

ACKNOWLEDGMENT: FRA  
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23 138130

## TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 1: SUMMARY REPORT

The technical, economic, environmental and sociopolitical issues associated with future intercity transportation options were assessed in a study which is reported in 7 volumes. This study placed emphasis on domestic passenger transportation but also considered interfaces with freight and international transportation. The initial phase of the study identified issues affecting the future of intercity transportation technologies (Vol. 2). The second phase focused on the future performance characteristics of present intercity modes (air; rail; high-speed ground, levitated; and highway transportation), and possible new technological forms of transportation (Vol. 3). The assessment of intercity transportation systems options was carried out within the framework of scenarios developed to describe 4 different states of society in the year 2000 (Vol. 4). A workshop was held to identify and assess impacts related to future transportation alternatives (Vol. 5). Study efforts then focussed on the continued assessment of impacts related to possible future intercity transportation innovations (Vol. 6) and on the development of recommendations (Vol. 7).

See also Volumes 2 through 7, N76-24076-N76-24081, RRIS 23 142232-142237 respectively; Bulletin 7802.

Department of Transportation Mar. 1976, 32 pp

Contract NAS2-8730

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N76-24075

23 142232

## TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 2: IDENTIFICATION OF ISSUES AFFECTING INTERCITY TRANSPORTATION

Papers are presented on important political, social, technological, institutional and economic mechanisms which will determine how future intercity transportation technologies will evolve and be put into service. Some papers address major issues from the point of view of reform, and point out that various improvements are in order. Specific options for improvement are presented, and include technology related papers on electric highway vehicles, automobile durability, intercity technology and organization, energy considerations in goods transportation, the auto industry, and organizational and regulatory issues. Technical analyses are also presented in which important trends affecting the evolution of intercity transportation are explored. The interactions between capital funds sources and technological changes in rail and air passenger transport are examined, as well as the cost-revenue squeeze in highway finance, the impact of deregulation, the effects of existing capital stocks on technology assessments, and trends in freight transportation.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Science Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 564 pp, Figs., Tabs., Refs.

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N76-24076

23 142233

## TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 3: TECHNOLOGICAL CHARACTERISTICS OF FUTURE INTERCITY TRANSPORTATION MODES

Transportation technology is explored at two levels: the technological possibilities foreseen for the year 2000 and immediately beyond; and the nature, development status, and basic characteristics of each modal variation. All transportation modal possibilities are discussed and their general characteristics are tested and evaluated. Judgement is then made as to which of these technologies will bring to transportation those qualities required by society and therefore are likely to be viable candidates for the time period concerned. Detailed technical, economic and environmental characteristics are given for the likely modes. The type of mission most suitable for each modal variation (i.e. commuter, short range, long range,

etc.) is noted, and separate sections are presented on air, rail, high-speed guided ground transportation and highway noises. Characteristics of technological form as well as economics are detailed.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Sciences Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 214 pp, Figs., Tabs., Refs.

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N76-24077

23 142234

## TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 4: SCENARIOS

Four alternative future states of society or background scenarios are described, and future intercity transportation systems called transportation scenarios are outlined, one for each background scenario. A report is also presented of a quantitative analysis of the transportation scenarios, including patronage estimates for the various postulated intercity systems. The scenarios which have been developed for analyzing and evaluating alternative future intercity transportation technologies in the next 25 to 50 years are based on the analysis of relevant social and economic trends. A qualitative description of intercity transportation systems as well as how the systems developed from those in operation today are presented. The Transportation Scenario I is characterized by national emphasis on economic growth, encouragement of business, and substantial advances in research and technology that have been placed in service on a large scale mostly by private industry. The setting for Scenario II includes national restraint on big business, encouragement of small business, and decentralization of population. The third Scenario is characterized by consensus-oriented public decision-making, increasing problems and inefficiencies in both the public and private sector, and little innovation. The setting for the fourth Scenario is characterized by a strong government focusing its programs on achieving a variety of social welfare goals.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Science Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 205 pp, Figs., Tabs., Refs., Apps.

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N76-24078

23 142235

## TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 5: WORKSHOP PROCEEDINGS

The intermediate results are reviewed of the study to assess technical, economic, environmental, and sociopolitical issues associated with future intercity transportation system options; the issues and impacts related to such alternatives are debated. The availability of funds is discussed and it is recognized that although capital may be scarce, there is a need to continue transportation research and technology development. Automobiles will continue as a dominant intercity mode. Numerous positive impacts were cited for intercity buses. Incremental improvement is foreseen for air service, and diverse views are expressed on the future prospects and impacts of intercity rail service. The prospects of electric highway technology appear to be dependent on the rate of development and eventual price of nuclear power generation; battery-powered automobiles for intercity travel are not likely because of range limitations. It was felt that improvements in access and terminals can lead to substantially better intercity transportation service and the view was expressed that better consumer information would enable travelers to use present and future intercity modes more effectively. Labor considerations were discussed, particularly the basic concern related to labor productivity: changes in work ethic may cause decrease in future productivity. Differing viewpoints were expressed on government roles in intercity transportation.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and

Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Science Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 145 pp, Figs., Tabs., 7 Ref., 3 App.

Contract NAS2-8730

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N76-24079

### 23 142236

#### TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 6: IMPACT ASSESSMENT

The consequences are described that might occur if certain technological developments take place in intercity transportation. The consequences considered are broad ranging, and include economic, environmental, social, institutional, energy-related, and transportation service implications. Among the future technologies considered here are the following: the fuel-efficient and conventional takeoff and landing (CTOL) subsonic aircraft; short and vertical takeoff and landing (STOL/VTOL) aircraft; American commercial supersonic transport aircraft I (SST); improved intercity buses; improved variations of combustion engine automobiles; electric automobiles with optional power pickup from electrified highways; dual mode (able to operate without driver control on automated highways) automobiles, trucks and buses; improved passenger trains; and very high-speed ground transportation systems. The assessment of possible impacts was undertaken through a systematic analysis approached from several directions: the impact on economic, natural and human resources; the point in the life cycle at which the impact is felt; the change of impact with time; the relationship between the extent of impact and the operant political, socioeconomic and physical conditions; and society's response to the impact and its effect on the impact.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Science Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 31 pp

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### 23 142237

#### TECHNOLOGY ASSESSMENT OF FUTURE INTERCITY PASSENGER TRANSPORTATION SYSTEMS. VOLUME 7: STUDY RECOMMENDATIONS

A limited number of possibilities are highlighted from among many explicit and implicit recommendations on possible research and technology efforts. In the area of intercity automobile transportation, it is recommended that an expanded program of propulsion system and vehicle design development be pursued, and a technology assessment study of impending technological and institutional changes to the automobile be undertaken. Case studies to identify and test ways to improve intercity bus services, and the assessment of regulatory policies affecting bus operations are recommended. Recommendations are also made regarding aircraft research and development; systems analyses of changes in aircraft scheduling, operations, and range of aircraft sizes; STOL aircraft and Short Runway Aircraft (SRA) systems; air traffic control; and airport landside improvement. The benefit cost analysis of AMTRAK services, and evaluations of high-speed passenger train service in specific corridors are also advocated. Recommendations are presented related to electric/automated highways (develop data and undertake systems study on options), access/egress and intermodal transfer (study experimentation and identify roadblocks), and energy and materials (for transportation vehicles). Recommendations related to traveler values and preferences, transportation finance, institutional impacts and regulatory controls.

Prepared by a technology assessment team (Peat, Marwick, Mitchell and Company; California University, Berkeley; Stanford University; Gellman Research Associates, Incorporated; and Science Applications, Incorporated) for DOT and NASA. See also Volume 1, N76-24075, RRIS 23 138130; Bulletin 7802.

Department of Transportation Mar. 1976, 64 pp, Figs., Tabs., Refs., 2 App.

Contract NAS2-8730

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N76-24081

### 23 163559

#### A STUDY OF EFFICIENCY INDICATORS OF URBAN PUBLIC TRANSPORTATION SYSTEMS

This report presents the efforts of a research project on efficiency problems of urban public transportation systems (UPTS). Three test regions were selected in an effort to discover, clarify, and understand the efficiency relationships within UPTS. The test regions vary from a small one-mode region to a large multimode region. The UPTS are first divided into three major system components i.e. primary services, support functions, and the network. Then each system is divided by mode, and each component by each distinct function carried within the system component. The inputs to the system are also divided by type, i.e. labor, capital, and energy, and according to the contributor i.e. the operator, the direct user, the society at large, and the government at all levels. Input units are also traced in terms of many costs (Fiscal Inputs Matrix) and physical units (Physical Inputs Matrix). System outputs are also separated by the receiver and the nature of the outputs. Efficiency analysis is then explored in a hierarchical manner exploring three types of relationships, i.e. system inputs vs. system outputs; component inputs vs. component inputs; and component outputs vs. component outputs. Efficiency indicators are then discussed as to the type of useful service they may offer in various types of efficiency analysis problems. /Author/

Sponsored by the Office of the Secretary, Department of Transportation.

Tomazinis, AR

Pennsylvania University, Philadelphia Final Rpt. DOT-TST-77-47, Jan. 1977, 299 pp, Figs., Tabs., 79 Ref., 9 App.

DOT-OS-502 28

ACKNOWLEDGMENT: NTIS

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### 23 165384

#### URBAN TRANSPORTATION ALTERNATIVES: EVOLUTION OF FEDERAL POLICY

The findings are presented of two successful conferences which formed the foundation of a unique process of federal rule-making, and the underlying process that culminated in the conferences is discussed. The availability of new funds for urban mass transportation in 1974 raised complex questions of equitable resource allocation. Reaching answers to these questions involved the developing of consensus on a series of compromise solutions that would best reconcile the competing demands of different claimants. The first conference in February 1975 reached agreement on five principles which dealt with regional multimodal strategy, incremental planning, managing of the existing system, framework for evaluation, and public involvement. Cost effectiveness and usable segments were other areas of Administration's (UMTA) description of the implementation of 1976 was to review the Urban Mass Transportation Administrations (UMTA) description of the implementation of the proposed policy as well as to review on the revised policy on Urban Mass Transportation Investment. A number of related issues were discussed at both conferences. Documents prepared by UMTA as background to the conferences are discussed.

Report of conferences held February 23-26, 1975 at Airlie House, Warrenton, Virginia, and March 29-April 1, 1976 Hunt Valley, Maryland, and sponsored by the Urban Mass Transportation Administration, U.S. Department of Transportation.

Transportation Research Board Special Report No. 177, 1977, 38 pp, 1 Fig., 2 Tab.

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### 23 167526

#### SURFACE RAIL-THE UNIVERSAL LOCAL PUBLIC TRANSPORT SYSTEM

As a universal system for local public transport a modular building block approach is proposed with comparatively few components for the cell, the axles, and the propulsion system. This can be used to build vehicles for road

transport, track-bound transport, and dual mode vehicles. The advantages of this universal system are: (a) advantages for the passenger: less frequent changing, better connection between starting point and destination, faster travelling, greater travelling comfort. (b) advantages for the operator: freedom to choose routes, reduction in the cost for those parts of the transport network where a separate lane is necessary, uniform means of transport for all transport modes, smaller range of stock items necessary, easier maintenance, simplified training. (c) advantages for society: lower cost for infrastructure, lower initial outlay for transport facilities, and operation, easy adjustment to changing transport requirements, free choice between track-bound transport, transport not confined to tracks, and dual mode transport. Possible to extend to fully automatic operation without driver. /TRRL/ [German]

Foerster, HH (Daimler-Benz AG, BRD)

Federation Intl Soc Ing Techniques de l'Automobile Analytic No Date, 8 pp, 9 Fig., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 227616)

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23 169705

## THE URBAN TRAVEL DEMAND FORECASTING PROJECT. PHASE I FINAL REPORT SERIES, VOLUME VI. ATTITUDES, BELIEFS, AND TRANSPORTATION BEHAVIOR

This volume includes detailed descriptions of several studies based substantially on subjective data, reflecting travelers' beliefs, attitudes, and intentions. Research topics were: (1) the importance of various travel attributes as influences on choices among car, bus, and BART commuting, and (2) attitudes reflecting basic preferences for auto and transit travel. Chapter 1 presents definitions of beliefs, attitudes, and intentions for use throughout the text and it discusses the relationships of the concepts to each other, to objective measures of physical phenomena, to the concept of utility, and to behavior. Chapter 2 describes a study of ten different travel attributes and their relative importance as influences on choices among car, bus, and BART for traveling to work in the San Francisco Bay Area. Attributes include cost, total travel time, dependability, relaxation, safety from accidents, use of time while traveling, flexibility, seat availability, safety from crime, and waiting time. Chapter 3 describes two studies of attitudes related to the basic characteristics of auto and transit travel—characteristics that do not vary substantially for different trips. References, tables, and figures are included.

See also Volume 8 dated Jun 77, PB-270 931 and Volume 11 dated August 77, PB-274318. Performed under Grants NSF-GI-43740 and NSF-APR74-20392.

Johnson, MA

California University, Berkeley, National Science Foundation Final Rpt. UCB-ITS-RR-77-12, NSF/RA-770281, Aug. 1977, 100 pp

ACKNOWLEDGMENT: NTIS

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23 169784

## TRANSIT PERFORMANCE MEASURES: THEIR SIGNIFICANCE IN LOCAL FUNDING ALLOCATION

Transit performance measures (TPM's) are the values of variables associated with transit performance, with respect to the vehicle, the service, use of the service, the costs of the service, and the social, economic and environmental impacts of the various elements of the physical systems. Urban transportation issues of interest in this study relate to the subvention of tax monies, whether state or federally collected. The main problem addressed is the development of meaningful TPM's for funding allocation. Other problems deal with difficulties in the use of TPM's, once evolved. This report should interest policy-makers dealing with the subvention of funds to local transit properties. A case study (CalTrans) is presented that provides a pragmatic feedback to the TPM evaluation presented. The report concludes that the utility of TPM's has been overestimated, particularly with regard to their use in allocating funds to individual transit properties.

Drosdat, HA

Washington University, Seattle, Urban Mass Transportation Administration, (UMTA-WA-11-0005) Thesis UMTA-WA-11-0005-78-2, RR-77-12, June 1977, 196 pp

ACKNOWLEDGMENT: NTIS

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23 170785

## BART NEARS THE END OF THE LONG HAUL

Bay Area Rapid Transit is striving for a reliability that will permit full-time operation. Problems are identified as train performance planned beyond physical limits and attempts to innovate in too many areas simultaneously without planning for adequate system performance when inevitable equipment failures occurred. Strengthened maintenance techniques and engineering efforts are improving car availability. Problems with the automatic train control have been compounded by the need to resignal the entire network for lower rates of deceleration than originally designed. The evolution of the automatic train protection system is described.

Herringer, FC (Bay Area Rapid Transit) *Railway Gazette International* Vol. 134 No. 1, Jan. 1978, pp 17-20, 1 Phot.

ACKNOWLEDGMENT: Railway Gazette International

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23 172023

## MOSCOW METRO TO DOUBLE IN LENGTH

With three lines under construction, plans now call for expansion of the Metro network serving the Moscow region from the present 164 km to 320 km, including an outer loop. Capacity is being expanded by improved interchange at central stations, while automatic operation and computer-aided traffic control should allow reduction of headways to 75 sec. New cars with light alloy bodies and chopper control are under development to reduce energy consumption.

Lebedev, MA (Moscow Metro Authority) *Railway Gazette International* Vol. 134 No. 1, Jan. 1978, pp 14-16, 4 Phot.

ACKNOWLEDGMENT: Railway Gazette International

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23 172543

## NORTHERN CORRIDOR BUS-RAIL STUDY

The immediate purpose of this project was to study Adelaide's northern corridor, as a pilot for other investigations elsewhere, "to determine the optimum location and size of interchanges, to develop a preliminary design for bus/rail co-ordinated services and to assess the economic viability of the proposals". The primary output of the study was seen as: (I) identification of stations suitable for development as mode transfer locations; (II) route, frequency and fare policies; (III) projected access mode usage levels; (IV) preliminary layout plans for the recommended interchanges; and (V) examination of the economic and environmental justification of the proposals. This report was prepared for the Director-General of Transport, South Australia. /TRRL/

Loder and Bayly Monograph July 1977, n.p., Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-229981)

ORDER FROM: Loder and Bayly, 79 Power Street, Hawthorn, Victoria, Australia

23 172644

## SUPERTRAM: METRO'S WELL-TRIED TECHNOLOGY. PART 2

Tyne & Wear Passenger Transport Executive's "Super-Tram" will come into service on the first 12 km. of its 54 km. Metro network in about 18 months' time. Author discusses Metro's technology--its rolling stock, signaling and ticketing arrangements--and looks at some of the major civil engineering works which are turning an underused conventional suburban railway into a modern rapid transit system tailored to the needs of 1980s Tyneside.

Part 1 in RRIS 23 170569; RRIS Bulletin 7801.

Aldous, T *New Scientist* Vol. 76 No. 1081, Dec. 1977, pp 630-632

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DOTL JC

23 172646

## BINARY LOGIT COMPETITION MODELS OF NYC-BUFFALO INTERCITY RAIL PATRONAGE: DEVELOPMENT AND APPLICATION

Using a 1975 aggregate data base of 31 city-pairs, forecasts are made of 1977-1985 rail patronage in the NYC-Buffalo corridor, using a two-stage modeling process. Total city-pair traffic by purpose is forecast using simple



gravity formulations relating annual volume to city size, government employment and hotel-motel sales receipts. Separate binary logit competition models are then developed in which rail competes differentially with air, auto, and bus, thus avoiding IIA assumptions. Rail service and terminal quality variables are included, as well as time, cost, and frequency. The total rail share is then determined algebraically from the binary models. Pivot-point analysis is used to increase the accuracy of the forecasts. Results show that rail competes differently with each mode. Against air, the key variables are frequency and time ratios; against auto, frequency, cost, time ratios, and terminal quality are important; against bus, train service quality, frequency ratio, and time difference are important. Elasticities of demand vary considerably for each mode and by distance, thus violating the IIA assumption. Forecasts show that if train, track, service, and terminal improvement are implemented as planned in the corridor over the next 5 years, 1980 rail volumes will increase 58-105% over 1975 levels, with most diversion coming from short-distance auto trips. Without such improvements, however, the general expansion of total corridor traffic will not substantially increase rail traffic.

Cohen, GS Erlbaum, NS Hartgen, DT  
New York State Department of Transportation Prelim Res Rpt 120, July 1977, 27 pp, 2 Fig., 4 Tab., 4 Ref.

ACKNOWLEDGMENT: New York State Department of Transportation  
ORDER FROM: New York State Department of Transportation, Planning Division, Albany, New York, 12232

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**23 172659**  
**DIFFERENCES BETWEEN THE TRUE SERVICE SPEEDS OF THE VARIOUS MODES OF SHORT-DISTANCE PUBLIC TRANSPORT** [Differenzen in der Beförderungsgeschwindigkeit öffentlicher Verkehrsmittel]  
No Abstract. [German]

Weimer, K *Verkehr und Technik* Vol. 30 No. 10, Oct. 1977, pp 401-405, 2 Tab., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schmidt (Erich) Verlag, Herforder Strasse 10, 4800 Bielefeld, West Germany

**23 173150**  
**PARIS-LYON SCHEME--ITS CONCEPTION AND OPERATIONAL PHILOSOPHY**  
Plans for a 300 km/h route linking Paris and the south dedicated to passenger expresses while the existing conventionally-engineered route continues to carry the freight and general traffic.

Portefaix A *Railway Engineer* Vol. 2 No. 6, Nov. 1977  
3 pp, 5 Fig., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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**23 173415**  
**A SIMULATION STUDY OF THE UTRECHT-NIEWEGEIN TRAMWAY LINE** [Simulatiestudie sneltram Utrecht-Nieuwegein]

No Abstract.

Breuers, PN *Verkeerskunde* Vol. 28 No. 12, 1977, pp 561-564

ACKNOWLEDGMENT: International Union of Railways, BD  
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**23 173416**  
**THE VARIABLE-PATH SYSTEM: A SOLUTION FOR OPTIMISING SURFACE TRANSPORT SERVICES FROM THE OPERATING STANDPOINT** [Variable Linienführung. Eine Massnahme zur betrieblichen Optimierung des Leistungsangebotes im Oberflächenverkehr]

The modulation of an initially-rigid schedule is seen as a means of containing the problem of traffic drops in passenger suburban transport. In order to improve profitability, vehicle efficiency should be increased, possibly through the introduction of flexible working hours, modification of shop closing hours and staggered school hours. In addition, the article proposes the phased adoption of a "variable-path system", and explains its principles and features in detail. [German]

Prusa, W *Nahverkehrspraxis* Vol. 25 No. 9, 1977, pp 373-374, 1 Phot.  
ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Arnold Verlag, Siegburg Strasse 5, 4600 Dortmund, West Germany

**23 173439**  
**MARKETING IN NEW NS STATIONS** [Marketing bij nieuwe NS-stations]

In this article the author mentions the criteria observed by the NS when planning a new station. He explains what he calls the "cycle theory" and illustrates the major role of the planning experts. He analyses the various possible alternatives for transport in a given region, describes the equipment in a station and concludes by defining marketing as it is understood on the NS. [Dutch]

Boonekamp, FJ *Openbaar Vervoer* 78 Vol. 11 No. 1, Jan. 1978, pp 28-31, 4 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Uitgeverij Ceres, Eendrachtstraat 2, Meppel, Netherlands

**23 173559**  
**MASS TRANSPORTATION ALTERNATIVES: AIR, HIGHWAY, BUS AND RAIL**

This article explains where we are today concerning mass transportation. It takes an in-depth look at the past, present and future projections of passenger traffic by discussing the interstate highway, rail, air, and bus systems. It outlines transportation needs in both urban and rural areas, as well as discussing problems which will need to be solved in order to make mass transportation a viable alternative to the private automobile.

Preprint for meeting held August 8-11, 1977.

Smith, PA  
Society of Automotive Engineers Preprint SAE 770679, Aug. 1977, 8 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**23 173560**  
**MODELING INTERCITY MODAL SPLIT: RAIL VERSUS AIR**  
A comparative assessment of various mathematical models used to describe the choice process between the two modes on domestic intercity routes in Great Britain.

Leake, GR (Leeds University, England); Underwood, JR *Transportation Engineering* Vol. 47 No. 8, Aug. 1977, pp 35-39, 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**23 173593**  
**DEVELOPMENT OF FAST/SLOW TRANSPORT MODE EVALUATION MODEL CONSIDERING PASSENGER LABOUR AND ITS APPLICATION**

Passenger effort has been neglected in the conventional transport demand and modal split models. The author develops a single-line traffic analysis in which a cost/benefit approach incorporates in traffic distribution not only trip time and fare but also the passenger effort required in terms of train transfers and the crowdedness of trains. A problem of track expansion between Tokyo and Takao is examined. Scheduling and track capacity are discussed in terms of express stops, frequencies of local and express trains, and tracks assigned for specific types of services.

Miyata, H *Railway Technical Research Inst. Quarterly Reports* Vol. 18 No. 4, Rpt No. 1035-77, Dec. 1977, pp 160-163, 6 Fig., 2 Tab.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

**23 174024**  
**TRANSPORTATION MODELING IN A CHANGING WORLD: A MIAMI CASE STUDY**

Cities throughout the United States are placing increasing demands on the Urban Mass Transportation Administration for funding of improved transit systems. Approximately 40 of these communities are serious about developing rapid transit in one form or another. However, as a class, these proposals are extremely expensive and could utilize the entire Urban Mass Transporta-



tion Administration funding as established under the National Mass Transportation Administration Act of 1974 (\$11 billion over six years). To assure fair, systematic evaluation of these requests, the Urban Mass Transportation Administration has developed a series of policy guidelines that emphasize local decision-makers in creating a sound approach to alternative systems evaluation so that the technical results of all "lead-in" studies to rapid transit funding requests can be factually supported. Traditional technical approaches to transportation models are not tailored to the needs of planners and decision-makers. Using the Miami setting as a basis, a modeling approach is discussed that is directed toward: providing local officials and planners with policy options that will allow them to achieve stated goals with regard to the role of the transportation system in the urban environment; and evaluating quantitatively and analytically the effects of various uncertainties on the capital-intensive system investments. This approach uses a mathematically based risk analysis model together with sensitivity analysis and policy modal split techniques. The first model evaluates the degree of uncertainty involved in patronage and revenue projections and thus provides measures of the risk involved in investment alternatives. The latter set of models is capable of developing system characteristics and policy combinations that will achieve modal split objectives for the region and for certain predefined trip and tripmaker strata. In addition to discussing these approaches and their application in Dade County, Miami, the role of calibration in the behavioral modeling package is described and illustrated.

Hinds, DH Roark, AL Schimpeler, CC Corradino, JC *Transportation Planning and Technology* Analytic Vol. 4 No. 2, Jan. 1978, pp 125-135, 5 Fig., 2 Tab., 6 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230949)  
ORDER FROM: ESL

## 23 174043 AMTRAK AND ITS TEXAS OPERATIONS. PASSENGER SERVICE EVALUATION. TECHNICAL REPORT 2

All intercity rail passenger service in Texas is operated by Amtrak. If Texas determines that it is feasible and fiscally responsible to provide additional rail passenger service in the state, this service would be implemented and operated by Amtrak with state financial assistance. This report is divided into three independent sections. The first section presents a description of the National Railroad Passenger Corporation. The second section describes opportunities for and experience with state subsidization of Amtrak service. The final section presents a description of existing rail passenger service in Texas.

Christiansen, DL Grady, DS  
Texas A&M University Aug. 1976, 115 pp, 22 Fig., 63 Tab., 13 Ref.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute, College Station, Texas, 77843

DOTL RP

## 23 174044 THE TECHNOLOGY OF RAIL PASSENGER SERVICE. PASSENGER SERVICE EVALUATION. TECHNICAL REPORT 3

This report provides a basic description of the technology associated with rail passenger service. The report represents a state-of-the-art overview based entirely on secondary references; it is not a detailed engineering study. Due to the importance of the track over which the trains operate, the first section of this report addresses certain track considerations. The second section of the report provides a description of the equipment used in intercity rail passenger service. This information will provide data that will assist in subsequent analyses of alternative courses of action that the State of Texas might pursue in considering rail passenger service.

Stout, RB Christiansen, DL  
Texas A&M University June 1976, 68 pp, 24 Tab., 63 Ref., 1 App.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute, College Station, Texas, 77843

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## 23 174045 AN EVALUATION OF INTERCITY TRAVEL IN MAJOR TEXAS CORRIDORS. PASSENGER SERVICE EVALUATION. TECHNICAL REPORT 4

This report evaluates the role that rail passenger service might play in serving intercity travel demands in Texas. The report initially justifies rail passenger service as a viable transportation alternative. Corridors warranting evaluation of rail service are then identified. Realistic capacity of highways in these corridors is then established. Methodologies are developed and utilized for projecting highway travel demands. In the fifth section the demand and capacities are compared so that the magnitude of congestion that can develop might be predicted.

Christiansen, DL Stout, RB  
Texas A&M University Nov. 1976, 121 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute, College Station, Texas, 77843

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## 23 174046 AN EVALUATION OF THE NEED FOR INTERCITY RAIL PASSENGER SERVICE IN TEXAS. PASSENGER SERVICE EVALUATION. TECHNICAL REPORT 5

This report determines the role that might be served by intercity rail in accommodating a portion of increased passenger travel demand estimated to exceed highway design capacity by 1990 in certain Texas travel corridors. Initially, the justification for considering intercity rail as an alternative mode is reviewed. A discussion of some general considerations associated with providing rail passenger service is then presented. In the third section of this report some corridor travel relationships are identified. The fourth section of the report discusses alternative approaches to addressing capacity deficiencies in the study corridors, and the fifth section presents a more detailed evaluation of the intercity rail passenger alternative. Following these five sections, significant findings from all five reports prepared for the passenger portion of the state rail evaluation are documented. Based on the findings, recommendations are presented.

Christiansen, DL Stout, RB Grady, DS  
Texas A&M University Jan. 1977, 167 pp, Figs., Tabs., 20 Ref., 5 App.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute, College Station, Texas, 77843

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## 23 174047 CONSIDERATIONS INFLUENCING THE FEASIBILITY OF COMMUTER RAIL SERVICE. PASSENGER SERVICE EVALUATION. TECHNICAL REPORT 6

This report addresses the feasibility of commuter rail operations designed to serve workday urban travel demands. This report does not provide a detailed evaluation of the potential for commuter rail service in any specific corridor; rather, it provides an overview of issues and problems that should be realized in evaluating the desirability of a commuter rail operation in any corridor. This report is divided into five sections. The first section describes the travel problems that exist which create an interest in the commuter rail alternative. The second section presents operating considerations that would be associated with a commuter rail system in Texas. Following this, a preliminary estimate of the market for commuter service in illustrative travel corridors is provided. The fourth section identifies the general magnitude of revenue and cost that might be generated by a commuter rail system. Finally, a synopsis of the major findings is presented.

Christiansen, DL Grady, DS  
Texas A&M University Jan. 1977, 36 pp, 7 Fig., 8 Tab., 6 Ref.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute, College Station, Texas, 77843

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## 23 174048 RAIL PASSENGER SERVICE IN TEXAS. SUMMARY REPORT

This summary report presents the major findings and recommendations in six technical reports that preceded it. The Texas state government assigned the Texas Transportation Institute the responsibility for performing a state

rail evaluation; a significant part addressed the possible need for increased intercity and commuter rail passenger service in the state. The first section of this report discusses the intercity study; the second the commuter rail study; and the third section presents the study recommendations.

Christiansen, DL  
Texas A&M University Mar. 1977, 28 pp, 18 Fig., 7 Tab., 7 Phot.

ACKNOWLEDGMENT: Texas A&M University  
ORDER FROM: Texas A&M University, Texas Transportation Institute,  
College Station, Texas, 77843

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#### 23 174951

##### TRAVEL HABITS AND PATTERNS, VOLUME 2, 1974-JAN 78 (A BIBLIOGRAPHY WITH ABSTRACTS)

This two-volume work is devoted to U.S. travel patterns and habits primarily in urban areas. Presented are discussions on mass transit, modal choices and split, parking, park and ride, and commuting. Disadvantaged, disabled, student, and various age groups are studied along with recreational data. References are made to dial-a-ride, dual mode, car pooling, taxicab, railroad, rapid transit railways, and aircraft. (This updated bibliography contains 179 abstracts, 25 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0033, and NTIS/PS-76/0026. See also Volume 1, 1964-73, NTIS/PS-76/0025.

Kenton, E  
National Technical Information Service Jan. 1978, 184 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0020/4ST

#### 23 174970

##### TRANSPORTATION USERS: DEMANDS AND NEEDS (A BIBLIOGRAPHY WITH ABSTRACTS)

The bibliography covers research on the needs and demands of transportation users. These users include the general public and specific groups including the elderly, the poor, commuters, and students. Most of the studies are concerned with urban mass transit systems and methods to predict their passenger usage. Studies covering specific localities as well as the U. S. in general are included. Predictions and needs of user groups are researched through questionnaires, counting techniques, and mathematical models. (This updated bibliography contains 253 abstracts, 85 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0038 and NTIS/PS-76/0044.

Kenton, E  
National Technical Information Service Feb. 1978, 258 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0131/9ST

#### 23 175357

##### TRAVEL TIME STUDIES FOR SURFACE TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)

Reports are cited on the transportation time in surface systems. Data are presented on shuttles, delays, bus and automobile usage, networks, queuing, walking, journey to work, planning, and human factors. Mathematical models and computer applications are included. References are to central city, urban, rural, and interstate movements of passengers. (This updated bibliography contains 191 abstracts, 16 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0023, and NTIS/PS-76/0002.

Kenton, E  
National Technical Information Service Feb. 1978, 196 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0146/7ST

#### 23 175656

##### PARAMETRIC STUDIES OF NORTH EAST CORRIDOR RAIL PASSENGER SERVICE BETWEEN NEW YORK CITY AND WASHINGTON, D. C

Speed profiles of rail passenger service between New York City and Washington, D.C. were developed and showed progressively fewer speed

restrictions and increasing maximum speeds. The significant equipment characteristics include the portion of the total weight on driven axles, i.e., multiple unit (MU) cars versus locomotive hauled trains, and the short term tractive effort rating of the motors. The ratio of acceleration plus braking time to total time is provided for validation of the use of the short term propulsion equipment ratings. Absolute trip times are shown to be determined primarily by the allowed speed profile. Locomotive hauled train weights and lengths and the locomotive capabilities and characteristics that are required to make the performance of this type of train comparable to that of MU trains are given.

Stallkamp, JA  
Jet Propulsion Laboratory NASA-CR-155553, JPL-PUB-77-75, Oct. 1977, 54 pp

Contract NAS7-100

ACKNOWLEDGMENT: NTIS  
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N78-15953/OST

#### 23 175779

##### AN ANALYSIS OF AMTRAK'S FIVE YEAR PLAN

Amtrak's 5-year plan requests that the Congress increase the Federal operating grant from the \$545 million requested in fiscal year 1978 to \$876 million in 1982, an increase of \$331 million. This study describes assumptions about inflation and improved efficiency contained in the Amtrak plan. It shows how the Congress can use the plan for making funding decisions and evaluating Amtrak's performance, and suggests ways of improving future 5-year plans.

General Accounting Office PAD-78-51, Mar. 1978, 31 pp

ACKNOWLEDGMENT: NTIS  
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PB-278624/2ST

#### 23 175894

##### URBAN TRAVEL DEMAND FORECASTING PROJECT PHASE I FINAL REPORT SERIES, VOLUME V. DEMAND MODEL ESTIMATION AND VALIDATION

The project attempts to provide transportation engineers and planners with the information necessary to select and use policy-oriented disaggregate behavioral travel demand models, and to assess the applicability and limits of specific alternative models. This volume is devoted to the investigations of demand, forming the core of this project. Data are collected on a sample of individual commuters in the San Francisco Bay Area before the initiation of Bay Area Rapid Transit (BART) service. BART patronage is predicted from demand models fitted to the pre-BART data. The predictions are compared with actual BART patronage, using a second survey taken after BART was in service. Attention is concentrated on work mode-choice. These studies demonstrate disaggregate travel demand forecasting to be a practical policy analysis tool. The limitations of the current generation of these models are spelled out, and suggest that considerable care is needed in their application to new mode forecasting, and in transferring models across populations.

Sponsored in part by Alfred P. Sloan Foundation, New York. See also Volume 3, PB-270 930. Grant--NSF-GI-43740, NSF-APR74-20392.

McFadden, DL Talvitie, A. Cosslett, S Hasan, I Reid, FA  
California University, Berkeley, National Science Foundation, Alfred P Sloan Foundation UCB-ITS-SR-77-9, NSF/RA-770328, June 1977, 590 pp

ACKNOWLEDGMENT: NTIS  
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PB-277381/OST

#### 23 176464

##### EVALUATION OF POTENTIAL POLICIES FOR INTERCITY PASSENGER TRANSPORTATION IN CANADA (ABRIDGMENT)

The study reported was the first attempt in Canada to carry out a national-scale multimodal passenger transportation policy analysis. The model is responsive to modal travel time and service frequency, modal fares, and city population and linguistic characteristics. Each policy option was interpreted and analyzed to deduce its effect on modal level of service or fare structure. The resulting amended modal travel times, service frequencies, and fares are then used in the demand model to estimate the effect of the policy on modal demand. The 1975 intercity air, bus, rail, and highway



systems and subsequent variations were defined on the basis of 94 communities that represent two-thirds of the Canadian population. The results give a reasonable indication of the directions and relative strengths of modal-demand shifts in response to various policy options.

This article appeared in the Transportation Research Record No. 637, Forecasting Passenger and Freight Travel.

Rea, JC Wills, MJ Platts, JB (Transport Canada) *Transportation Research Record* No. 637, 1977, pp 77-81, Fig., 3 Tab., 10 Ref.

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## 23 176698

### EXAMINATION OF SIMPLIFIED TRAVEL DEMAND MODEL

A simplified travel demand model, the Internal Volume Forecasting (IVF) model, proposed by Low in 1972 is evaluated as an alternative to the conventional urban travel demand modeling process. The calibration of the IVF model for a county-level study area in central Wisconsin results in what appears to be a reasonable model; however, analysis of the structure of the model reveals two primary mis-specifications. Correction of the mis-specifications leads to a simplified gravity model version of the conventional urban travel demand models. Application of the original IVF model to "forecast" 1960 traffic volumes based on the model calibrated for 1970 produces accurate estimates. Shortcut and ad hoc models may appear to provide reasonable results in both the base and horizon years; however, as shown by the IVF model, such models will not always provide a reliable basis for transportation planning and investment decisions.

Smith, RL, Jr (Wisconsin University, Madison); McFarlane, WJ *ASCE Journal of Transportation Engineering* Proceeding Vol. 104 No. TE1, ASCE 13483, Jan. 1978, pp 31-41

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

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## 23 176701

### WHAT A WAY TO GO

The author describes how Toronto's new 6.17-mi transit extension sets a pattern for efficient mass transit. Problems associated with the entrance design and noise reduction are discussed.

Myers, ET *Modern Railroads/Rail Transit* Vol. 32 No. 11, Nov. 1977, pp 56-59

ACKNOWLEDGMENT: EI

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## 23 176717

### INTERCITY RAIL PATRONAGE IN THE NYC-BUFFALO CORRIDOR: MODELS AND FORECASTS

Using a 1975 data base of 31 city-pairs, forecasts are made of 1977-1985 rail patronage in the NYC-Buffalo corridor, using a two-stage modeling process. Total city-pair traffic by purpose is forecast using simple gravity formulations. The rail share is then estimated using binary logit competition models in which rail competes differentially with air, auto, and bus. Rail service and terminal quality variables, are included, as well as time, cost, and frequency. Pivot point analysis is used to increase the accuracy of the forecasts. Results show that rail competes differently with each mode. Against air, frequency and time ratios are the key variables; against auto, frequency and cost, and time ratios, and terminal quality are important; against bus, train service quality, frequency ratio, and time difference are important. Elasticities of demand vary considerably for each mode, thus violating the IIA assumption. If train, track, service, and terminal improvement are implemented as scheduled in the corridor over the next 5 years, 1980 corridor, rail volumes will increase 58-105% over 1975 levels. Without such improvements, however, the general expansion of total corridor traffic will not substantially increase rail volumes.

Cohen, GS Erlbaum, NS Hartgen, DT

New York State Department of Transportation Vol. 3 Prelim Res Rpt. N115, May 1977, 107 pp, Figs., Tabs., 6 Ref., 3 App.

Contract DOT-OS-60124

ACKNOWLEDGMENT: New York State Department of Transportation

ORDER FROM: New York State Department of Transportation, Planning and Research Bureau, State Campus, Albany, New York, 12232

DOTL RP

## 23 176908

### PASSENGER TRANSPORTATION IN NORTH AMERICA. AIR VERSUS GROUND

The author presents a review of the usage of different travel modes in North America supported by statistical evidence from the years 1970 to 1974. Rail, road and air travel are analyzed in turn and comparisons made with equivalent systems in Europe. 90 per cent of passenger-kilometres are accounted for by the car and the remaining 10% split between air, rail and bus, is dominated by air. The bus is identified as having the greatest potential as yet unrealized. STOL is briefly mentioned and suggestions made for possible new modes of travel and intermodal systems. This paper was presented to the 15th anglo-american aeronautical conference in London, June 1977 (paper no 512/18).

Hanchet, WHD (Transport Canada Research and Development Centre) *Aeronautical Journal* Analytic Vol. 82 No. 805, Jan. 1978, pp 33-37, 8 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-231757)

ORDER FROM: ESL

DOTL JC

## 23 176909

### LT HEATHROW LINK COMPLETE. LONDON TRANSPORT'S UNDERGROUND RAILWAY LINK TO HEATHROW AIRPORT COMPLETE

A brief description is given of the new section of underground linking Heathrow Airport to the existing Piccadilly line. Aspects covered include layout, construction details, interior design, timing of train services and communications, which include a closed circuit TV link to the line controller at Earls Court. Tourist facilities include a comprehensive information centre staffed by British Rail, London Transport and the London tourist board, a sterling exchange office and a computer-controlled journey-planner for routine route information.

*Modern Railways* Analytic Vol. 35 No. 353, Feb. 1978, pp 70-71, 1 Tab., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-231802)

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DOTL JC

## 23 176913

### ESTIMATES OF FUTURE TRAFFIC VOLUME [Schätzungen des Künftigen Verkehrsumfanges]

Market research is just as important in traffic engineering as it is for a company. Traffic estimates should take into account the sociological, economical and technical aspects simultaneously. This important exercise can only be properly conducted by a comprehensive study of the problem. In many respects the climax of development has passed. Population is on the decrease, an increase in maximum speed has no further advantages, the railway network is more or less complete apart from a few express-and urban routes and the extension of the highway network will probably be complete within a few years. As opposed to the constructive aspects of traffic engineering, the operational aspects are gaining importance. The transition between different modes of transport, and journey speeds, especially in town traffic conditions, has to be improved. A careful watch on the situation will enable reliable estimates for the future to be possible and will assist in avoiding incorrect investments. [German]

Leibbrand, K *Internationales Verkehrswesen* Analytic Vol. 29 No. 2, Mar. 1977, pp 100-103

ACKNOWLEDGMENT: TRRL (IRRD-306521), Federal Institute of Road Research, West Germany

ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

## 23 176914

### A NEW METHOD FOR INVESTIGATING THE OPERATION OF TRAFFIC JUNCTIONS [Eine Neue Methodik zur Betrieblichen Untersuchung von Verkehrsknoten]

Since the operation and construction of permanent works for rail and road transport necessitate high expenditure, careful planning of these is essential, from the economic viewpoint alone. This planning should also incorporate a check on their efficiency and utilization rate. The method of investigation shown enables movement patterns at traffic junctions and railway stations of any layout and size to be studied. Examples show that the method, based on the graphic theory, can be adopted for both lane-directed systems and

non lane-directed systems, with appropriate revisions. The traffic engineer has with this method a means of analysis at his disposal which offers, at justifiable cost, important aids to decision making for many transportation planning problems. [German]

Voelz, WD Kracke, R (Technical University of Hannover, West Germany) *Internationales Verkehrswesen* Analytic Vol. 29 No. 2, Mar. 1977, pp 112-116, 5 Fig., 3 Tab., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-306522), Federal Institute of Road Research, West Germany  
ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlerstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

### 23 176922

#### SHEFFIELD AND ROTHERHAM LAND-USE/TRANSPORTATION STUDY. 3. TRAMS FOR SHEFFIELD?

This paper deals specifically with the development and testing of a modern tramways system for operation within the city of Sheffield. The main reasons for the initial examination of such a system arose firstly, from the fact that the city planned a rapidly-expanding commercial centre in a region of 800000 people; secondly, because there was limited space for highway expansion radial to the city centre and strong environmental objectives to such; and finally, due to the growing uncertainty over the long-term availability of oil. The paper looks initially at the two main stages in the development of the tramway system. Stage 1, as a preliminary analysis, concentrated on examining the potential, corridor by corridor, of a system based on the concept of the light articulated tramcar presently in use in a large number of continental cities. Stage 2, investigated a specific system in depth using the full transportation model to forecast peak and off-peak flows and benefits for 1986, the study's forecast year. The system, as described, was assumed to be low voltage, say 600 V d.c., overhead pick-up, 2.2 or 2.5 M wide, articulated or car-and-trailer stock running on a network of 110 km, with on-vehicle fare collection or pre-purchase fares and an average stop spacing of 300-400 M. The paper examines the derivation of operating costs and capital costs, the effect of such a system on other 'on-street' traffic and a comparative assessment of bus and tram systems. Final recommendations are defined by reference to a proposed, reduced, 60 km system at a capital cost of 20 M pounds, and the recommendation that rights-of-way be reserved immediately in order that construction of a fixed-track system could be undertaken during the later 1980's. For abstracts of parts 1, 2, 4 and 5, see IRRD Abstract Nos. 227772, 228768, 231331 and 231332 respectively.

Coventry, PS (Martin and Voorhees Associates, England) *Traffic Engineering and Control* Analytic Vol. 18 No. 10, Oct. 1977, pp 470-474, 3 Fig., 2 Tab., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-229481)  
ORDER FROM: ESL

DOTL JC

### 23 176923

#### LIGHT RAPID TRANSIT

The phrase light rapid transit (lrt), together with alternative descriptions such as intermediate rapid transit (irt), or pre-metro has been used to describe those rail systems which were neither full or 'heavy' rapid transit systems, eg. the London underground, the Paris metro and the Munich u-bahn, nor conventional modern tramway systems. The author discusses the development of such systems and suggests that there are two main reasons for the interest in and development of these 'intermediate' systems: one to reduce the cost of a rapid transit system, and the other as an intermediate step to the achievement of a full rt system involved as this is with the necessity to provide for complex signalling systems, intrusive overhead equipment and larger cars. The author describes recent visits to Antwerp, Brussels, Cologne, Hannover and Frankfurt undertaken to study the current state-of-the-art in such transit systems, and to see if any principles or guidelines for more general application are discernible. In particular, does LRT have a place in Britain? The objectives, approach and systems are briefly described and contrasted. As a result of this study it is suggested that there are clearly two lines of development: the pre-metro system as being developed in Brussels, and the lrt systems as being developed as an end in themselves in Antwerp, Cologne/Bonn, Hannover and Frankfurt. Such developments are discussed, and the question 'do lrt systems have anything to offer in the British scene' is considered in relation to the Tyneside metro.

Hellewell, S *Traffic Engineering and Control* Analytic Vol. 18 No. 11, Nov. 1977, pp 532-537, 4 Fig., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-231958)  
ORDER FROM: ESL

DOTL JC

### 23 177124

#### COMPARING MODES IN URBAN TRANSPORTATION

Modal comparisons are defined as those studies in which an analyst compares urban transport modes with each other in a generalized framework, attempting to assess relative advantages and disadvantages of modes under a variety of conditions. This paper establishes a link between comparative analyses of transport modes and urban planning processes and generates a basis both for a normative theory of modal comparisons and for a critique of existing works in this field.

This article appeared in Transportation Research Record No. 639, Transportation System Evaluation Techniques.

Mitric, S (Ohio State University) *Transportation Research Record* No. 639, 1977, pp 19-24, 15 Ref.

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### 23 177165

#### ZONE THEORY OF SUBURBAN RAIL TRANSIT OPERATIONS: REVISITED

Zone theory discussed deals primarily with the scheduling of trains. In combination the zone train schedules and zone fares affect most aspects of railroad operations and planning, including crew schedules and the use of railroad equipment, track, and manpower. The zonal concept of train operations applies to highly patronized suburban transit systems operated over the multitracked route of a heavy-duty main-line railroad. The basic theory has been tested and found to produce improvements.

Eisele, DO *Traffic Quarterly* Vol. 32 No. 1, Jan. 1978, pp 5-22, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

### 23 177181

#### SAO PAULO METRO E-W LINE INNOVATIONS

This paper describes the vehicles, track design, stations, and control system of the planned east-west line of the Sao Paulo (Brazil) Metro, scheduled to begin partial service by January 1980. Three objectives have been followed in the specifications for the E-W line. The first objective is to increase the reliability and availability of equipment on the E-W line. This is to be achieved by increasing the reliability of the equipment itself and by providing different levels of operation so that service can be continued under degraded conditions when equipment failures occur. The second objective is to increase the proportion of equipment manufactured in Brazil to 60% of total cost. The third objective is to reduce the cost per kilometer of the E-W line as far as possible.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Costa, BL Kalra, PS  
Institute of Electrical and Electronics Engineers Conf Paper n 77CH1246-8-1A, 1977, 5 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

### 23 177186

#### TECHNOLOGY SELECTION AND DEVELOPMENT FOR AN INTERMEDIATE CAPACITY TRANSIT SYSTEM

The objective of the Intermediate Capacity Transit System (ICTS) program is the development and implementation of a transit mode which offers a high degree of community acceptance and high service levels for urban applications in the capacity range of 5,000-15,000 pphpd. Elevated and at-grade guideways will be used as much as possible in lieu of underground construction to reduce system capital costs. The primary emphasis on urban integration has led to stringent requirements for minimum wayside intrusion. Features of the ICTS include steel-wheel on steel rail suspension, steerable trucks, alternating-current propulsion, and moving-block train control. The government of Ontario has funded a three year, \$55.5M development program to design, construct and test a prototype system. The



ICTS program includes the development of advanced electrical systems for longitudinal control of the vehicle, specifically, high power inverters and complex microprocessor applications in braking and signalling.

Conf Rec IAS 12th Annual Meeting, Los Angeles, California, October 2-6, 1977.

Renfrew, RM (Urban Transportation Development Corp Ltd, Canada)  
Institute of Electrical and Electronics Engineers Conf Paper n  
77CH1246-8-1A, 1977, pp 935-945

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

## 23 177202

### A TWO-PERIOD ANALYSIS OF COMMUTER MODE CHOICE: THE PREDICTIVE CAPABILITY OF INDIVIDUAL CHOICE MODELS

The estimation of travel demand is considered to have assumed an increasingly important role in public-policy decision making, with today's ever-tightening government budgets and increasing awareness of the energy costs of alternative transport systems. It is therefore considered to be of paramount importance to estimate as accurately as possible future demands on transport networks if enlightened decisions concerning these networks are to be made. In this paper the important question of the accuracy of the predictions of transport demand models is considered, and the predictive capabilities of individual binary mode choice models using a two-period data set of commuters in the Sydney metropolitan area is investigated. The prediction test procedure is outlined, and shown applied with data collected in 1973 in a model estimated on 1971 data. The predictive capability of individual mode choice models is illustrated and discussed by reference to three studies: A 1970 study which used data gathered for the study of mode choice in the Chicago northwest corridor where the choice was between the car and a high quality suburban rail service; a 1973 study concerned with modal choice between car and train for medium-range intercity work in the Forth-Clyde corridor of the central lowlands of Scotland; and a 1974 study conducted in Sweden which estimated a model on survey data for commuter work trips in the Stockholm metropolitan area in 1968 and then tested it against a similar transportation survey in 1971 in the same area. The authors conclude that this two-period analysis has demonstrated the predictive capabilities of behavioural modelling procedures that adopt the individual traveller as the unit of analysis, and that it has also provided a benchmark for emphasizing the need to continue a data-collection effort every two to three years so that system changes over time can be investigated and an improved knowledge of traveller behaviour over time can be gained. /TRRL/

Hensher, DA Johnson, LW (MacQuarie University, Australia) *Logistics and Transportation Review* Vol. 13 No. 4, 1977, pp 361-375, 5 Tab., 23 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231800)  
ORDER FROM: British Columbia University, Canada, Faculty of Commerce,  
Vancouver V6T 1W5, British Columbia, Canada

## 23 178141

### METRO, MARTA, AND BART; THE FAILURE OF HEAVY RAIL TRANSIT IN MEDIUM DENSITY COMMUNITIES

No Abstract.

Hall, R *California Engineer* Vol. 56 No. 3, Feb. 1978, pp 16-17

ORDER FROM: California University, Berkeley, Student Engineers' Joint Council, 9 Northgate Hall, Berkeley, California, 94720

## 23 178146

### THE TROLLEY SUBWAY OF FORT WORTH REVISITED

Civil engineer transit planners can find valuable lessons in the successful operation of a trolley subway by a department store in Fort Worth, Texas. Qualities of ingenuity, economy, efficiency, and craftsmanship could have application also in big city transit.

Schumacher, R (New York City Department of Transportation) *ASCE Engineering Issues-J of Prof Activities* Vol. 104 No. 2, Apr. 1978, pp 107-113

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 23 178150

### ROLE OF SECURITY IN MARKETING URBAN MASS TRANSPORTATION

The study reported was conducted to provide input on the security-oriented attitudes and perceptions of users and non-users of public transportation for use in a large scale transit marketing study of the Chicago metropolitan area. Consideration is given to the saliency of security among these different groups, to various dimensions of the security problem as perceived by the respondents, and the implications of these perceptions for the marketing of urban mass transit.

Feldman, LP (Illinois University, Chicago); Vellenga, DB *High Speed Ground Transportation Journal* Vol. 11 No. 2, 1977, pp 157-172, 22 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 23 178158

### PLANNING FOR INTERCITY RAIL PASSENGER SERVICE AT THE STATE LEVEL

A significant portion of the study described addressed the need for additional intercity rail passenger service. The planning effort was performed as a multi-modal, intercity corridor study. This paper presents the major findings and recommendations developed by the technical staff as a part of the intercity rail passenger study.

Christiansen, DL (Texas A&M University) *Transportation Engineering* Vol. 48 No. 2, Feb. 1978, pp 13-17, 15 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 23 178454

### INTER-CITY OUTLOOK ON BRITISH RAIL

This interview with Peter Keen, chief passenger manager of British Railways, deals with patronage of the High Speed Trains, incentive fares, competition, catering services, sleeping cars and coordination with continental services.

Allen, GF *Modern Railways* Vol. 35 No. 357, June 1978, pp 253-256

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

DOTL JC

## 23 178495

### COST-EFFECTIVENESS GUIDELINES FOR TRANSIT PLANNING

Cost-effectiveness has increasingly become a required feature of rapid transit planning for Federal approval. Uncertainty still exists with regard to what specifically constitutes cost-effectiveness analysis. With respect to measures of "transport" cost-effectiveness, a framework is proposed as a guide to which measures should be incorporated into an alternatives analysis involving rail transit proposals. Consideration should be given to the use of "marginal" measures that reflect the marginal costs, marginal usage, or marginal capacity provided by one alternative over another and to sensitivity analyses that indicate the impact of variations in required input forecasts. For rail systems it is important to provide measures at the corridor or subarea level since systemwide measures, although valuable, can mask variations in performance by line or line segment. Because of their high capital cost, it is also important to calculate measures that reflect total costs of rail systems, not just operating costs.

Skinner, RE, Jr (Voorhees (Alan M) and Associates, Incorporated);  
Deen, TB *ASCE Journal of Transportation Engineering* Vol. 104 No. 3,  
May 1978, pp 335-348, 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 23 178541

### A REEXAMINATION OF THE AMTRAK ROUTE STRUCTURE: PRELIMINARY REPORT TO CONGRESS AND THE PUBLIC

In response to congressional requests, the Department of Transportation has reexamined the Amtrak route structure and proposed a reduction of about one-third in the 27,000-mile system to curb steadily rising deficits which

have to be met with public subsidies. The goal of the study is to present background information and data to permit an evaluation of the recommendations by Congress and the public. The chapters: Introduction; A Brief History of Intercity Rail Passenger Operations; The Existing System and Its Operation; Recommended Route Structure; Total Funding Needs and Sources; Additional Issues for Public Comment (Fare Policy, Market for Intercity Rail Passenger Service, Emerging Corridors, Commuter Service, Sleeping Car and Auxiliary Services, Amtrak--Institutional Arrangements and Problems).

Department of Transportation May 1978, 125 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: DOT

ORDER FROM: DOT

DOTL RP

### 23 178916

#### THE SIGNIFICANCE OF STATION STOP TIMES IN URBAN RAPID TRANSIT SYSTEMS [Die Bedeutung der Haltezeit im Stadtschnellbahnbetrieb]

Station stop times in urban rapid transit systems can be divided into operating and traffic components. Their proper dimensioning calls for comprehensive analytic and synthetic studies of time and sequence for the method of train dispatching used, likewise extensive traffic surveys to provide information on the entry and exit situation at the stations. Also to be considered are the constructional features of both vehicle and platform, a knowledge of which allows passenger exchange times to be determined. In order to avoid changes in timetable frequency during the day's working, the station stop times at rush hours provide a basis for arranging the timetable. The author illustrates his views with a calculated example. [German]

Dirmeier, W *Eisenbahningenieur* May 1978, 5 pp, 3 Fig., 5 Ref.

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

### 23 178942

#### IMPROVED PASSENGER SERVICE FOR THREE CORRIDORS

The study identifies and estimates the cost of right-of-way facility improvements necessary to provide for improved passenger trains operating at maximum speeds of 120-150 mph in three transportation corridors; Chicago-Detroit, Portland-Seattle, and Los Angeles-San Diego. An examination was made of the existing track condition and alignment, curve elevations and spiral lengths, bridge conditions and fencing requirements for safety, in order to identify the necessary system changes necessary to permit a high speed rail operation. A train interference analysis indicated facility modifications were required to relieve the congestion caused by the improved passenger service at specified frequencies. In the Chicago-Detroit Corridor

the total cost of modifications is \$64 million; in the Portland-Seattle Corridor the total cost of modifications is about \$27 million; and in the Los Angeles-San Diego Corridor the total cost of modifications is \$26 million.

Pan-Technology Consulting Corporation Final Rpt. FRA-ORD/D-74-4, Apr. 1973, 56 pp, 13 Fig.

Contract DOT-FR-20080

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

DOTL NTIS

### 23 179153

#### ECMT. ROUND TABLE 38 (PARIS, 24-25 MARCH 1977). POSSIBILITIES OFFERED BY CERTAIN TRADITIONAL TECHNIQUES FOR URBAN TRANSPORT. TRAMS AND TROLLEYBUSES [CEMT. Table ronde 38 (Paris, 24-25 mars 1977). Possibilités offertes par certaines techniques traditionnelles pour les transports urbains. Trams et trolleybus]

After a short historical review of rail-borne public transport and its competitors, the author studies what is actually required of local public transport. Respect for the environment and easy access to the town centre are two essential elements for assessing a public transport system, which, to be efficient, must have its own right of way. The author advocates "express trams" in medium-sized towns. [French]

European Conference of Ministers of Transport SNCF Cat 01 N310, 1978, 78 pp, Tabs., Photos.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: OECD Publications Center, 1750 Pennsylvania Avenue, NW, R1207, Washington, D.C., 20006

### 23 179159

#### THE MODAL SPLIT IN LONG DISTANCE PASSENGER TRAFFIC [Der Modal-Split des Personenfernverkehrs]

Special care must be taken when making analyses of long-distance road, rail and air passenger traffic in order to obtain a valid model that takes account of all the decisive factors involved. The article explains how the Trip-End and Trip-Interchange-Modal-Split methods were used successively to obtain the triple Modal Split method suitable for use and confirmed by statistics. [German]

Littger, W *Internationales Verkehrswesen* Vol. 30 No. 1, Jan. 1978, pp 33-38, 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

24 168989

## LABOR RELATIONS IN URBAN TRANSIT

The study focuses on labor-management relations in the urban mass transit industry from 1960-1975, a period during which most of the major transit systems changed from private to public ownership and began receiving substantial funding from government. A major objective of this study was to evaluate how collective bargaining outcomes--transit wages, labor cost, and work rules--changed with the advent of public ownership and public subsidies. Two chapters of this study examine the development of Amalgamated Transit Union (ATU) policies and how they affect practices in the urban transit industry. The political, legal, and economic factors shaping the collective bargaining relationship are explored. Data on wage and selected fringe benefit changes in the 1960-75 period are reviewed.

Stern, JL Miller, RU Rubinfeld, SA Olson, CA Heshizer, BP Wisconsin University, Madison, Urban Mass Transportation Administration Final Rpt. UMTA-WI-11-0004-77-2, Aug. 1977, 327 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-274059/5ST, DOTL NTIS

24 169270

## MULTI-MODAL TRANSPORTATION FEASIBILITY STUDY OF THE BRUNSWICK, GEORGIA TO KANSAS CITY, MISSOURI ROUTE

The study was performed pursuant to Section 142 of the Federal Aid Highway Act of 1976 (PL 940280). From data supplied by the state transportation agencies, 4 highway and 3 rail alternatives were identified and evaluated in terms of traffic and cost for the period 1976-1990.

Prepared in cooperation with COMSIS Corp., Wheaton, Md., DTM, Inc., Bethesda, Md., and Engineering Science, Inc., McLean, Va.

Ellis, R Prokopy, J Coulter, J Peat, Marwick, Mitchell and Company, Comsis Corporation, DTM, Incorporated, Engineering Science, Incorporated, Office of Policy, Plans and International Affairs DOT/TPI/10-77/28, Sept. 1977, 252 pp

Contract DOT-OS-70027

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-275160/0ST, DOTL NTIS

24 170784

## THE APPLICABILITY OF SECTION I(18) OF THE INTERSTATE COMMERCE ACT TO RAIL LINE CONSTRUCTION IN WESTERN COAL REGIONS

A provision of the Interstate Commerce Act exempting spur and industrial tracks from Federal regulation when located within a state is examined in the light of new railroad construction. Development of Western coal reserves promises to spark a resurgence in railroad building. Much of this construction will be undertaken without effective ICC control as railroads seek to invoke the exemption to cover length lines and in other cases arrange for shipper construction which eventually then will be purchased by the carriers. The implications for national transportation policy and for possible adverse impact on the viability of existing, older segments of a carrier's network are examined. A table lists 1,088 miles of such lines under construction or projected.

Falk, MJ Chais, RI *ICC Practitioners' Journal* Vol. 45 No. 2, Jan. 1978, pp 175-194

ACKNOWLEDGMENT: ICC Practitioners' Journal  
ORDER FROM: Association of Interstate Commerce Comm Pract, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

24 172636

## GRAIN AND RAIL IN WESTERN CANADA

This volume contains seven reports which are part of the research carried out on the evaluation of grain transportation and handling systems in western Canada. These reports indicate some of the constraints on retention and expansion of the secondary agricultural industries in western Canada, as well as a look at the energy implications of changes in the branch line network and the minitrain as an alternative to conventional branch line operations. These background papers are part of the input to conclusions reached and recommendations made by the Commission in Volume I. The papers: Cost of Hauling Grain by Farm Truck in Western Canada; Road

Costs; The Energy Implications of Rationalization of Light Density Branch Lines; The Impact of Branch Line Abandonment on the Fiscal Viability of Local Governments; Mini-Train Operation with Transloading Facilities--A Feasibility Study; Commercial Trucking Costs and Features; Transportation-Related Distortions in the Canadian Flour Milling Industry.

Report of the Grain Handling and Transportation Commission, Government of Canada. See also Volumes 1 and 3 RRIS 24 178554 and 178553 respectively; Bulletin 7802.

Ministry of Supply and Services, Canada Vol. 2 1977, 434 pp, Figs., Tabs., Refs., Apps.

ACKNOWLEDGMENT: Ministry of Supply and Services, Canada  
ORDER FROM: Ministry of Supply and Services, Canada, Printing and Publishing, Ottawa, Ontario K1A 0S9, Canada

DOTL RP

24 172637

## RAIL TRANSPORTATION SERVICES ON THE DELMARVA PENINSULA

Following the failure of Southern Railway and railroad labor to agree on acquisition of Penn Central lines on the Delmarva Peninsula, legislation required RSPO to report on why the final system plan was not followed in the Southern's case and recommendations on continuation of viable rail service in the area. Recommendations for assumption of the service by a short-line railroad were made.

Report to the Congress submitted in accordance with Section 302 of the Rail Transportation Improvement Act Ex Parte No. 293 (SUB-NO. 11).

Interstate Commerce Commission Apr. 1977, 155 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: Interstate Commerce Commission  
ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, Washington, D.C., 20423

DOTL RP

24 172938

## THE RAILWAY TECHNICAL RESEARCH INSTITUTE OF JNR (RTRI)

The Railway Technical Research Institute of the Japanese National Railways is an all-round research organization on railways and the center of technical development of the JNR, where Research & Development are carried out over a wide field. The RTRI's seventieth birthday was celebrated on April 1, 1977. This article covers all facets and activities of RTRI especially recent R&D on derailment prevention, noise, vibration and magnetic levitation.

Maruyama, H (Railway Technical Research Institute) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 13-15, 1 Tab., 6 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

24 172941

## OUTLINE OF A PLANNED GENERAL TEST LINE FOR SHINKANSEN

Since its opening to traffic thirteen years ago in 1964 between Tokyo and Shin-osaka, the Shinkansen has been under continuous expansion, and now the Tohoku Shinkansen is under construction between Tokyo and Morioka. However, there have been a few problems with the Shinkansen such as noise and vibration caused by the high speed operation. Therefore, JNR has decided to build an experimental test line of 42.8 km, to be incorporated in the Tohoku Shinkansen now under construction before the completion of the whole line for the purpose of solving these problems as well as conducting tests on the rolling stock, the track and structure, and the electrical systems. These tests are outlined in this article.

Ohtsuka, S (Japanese National Railways) *Japanese Railway Engineering* Vol. 17 No. 3, 1977, pp 7-8, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering  
ORDER FROM: Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan

DOTL JC

## 24 173045

**MODERNIZATION OF TRACK ON THE INDIAN RAILWAYS**

This paper presents a brief discussion covering physical and financial statistics related to the Indian Railways system and how it has progressed during the past 15 years. Advantages are given for the use of long welded rails in relation to greater comfort of passengers and less maintenance. The elastic fastener and concrete sleepers, as well as the use of track laying machinery are discussed. The effects of heavy ore movements on the Eastern and South Eastern Railways in India on the rails are discussed. These involve accelerated wear, joint battering, rail fractures, and the shortening of rail life. The solution to the problem was to replace the 44-kg rail with the heavier 60 kg/52 kg rail with higher tensile strengths and wear-resistant characteristics, and to weld joints. The wear-resistant rails are being manufactured at the Hindustan Steel Ltd. (HSL) plant.

Charani, K *Indian Railways* Vol. 19 No. 1, Apr. 1974, pp 51-53, 2 Fig.

ACKNOWLEDGMENT: Battelle Memorial Institute

ORDER FROM: Indian Railway Board, Rail Bhawan, Raisina Road, New Delhi, India

DOTL JC

## 24 173143

**AN APPRAISAL OF THE TECHNICAL ASSISTANCE RECEIVED BY THE RAILWAYS OF LATIN AMERICA**

Because many Latin American railways were built to transport agricultural or mineral products to points of use or to seaports, and because they were built at low cost in regions with unfavorable terrain, they today do not constitute networks for adequately serving their nations. They are not profitable and vulnerable to highway competition. For some years they have been receiving technical assistance, usually from outside the continent which has brought about a transfer of technology. This is a report of a seminar organized to evaluate the assistance already received with a view to improving its effectiveness in the future. The experience of the railways and of the international agencies which finance or supervise such assistance is reported in this document, along with recommendations for the future.

Report from seminar held in Montevideo, Uruguay, October 13-18, 1975, concurrently with the Eleventh General Assembly of ALAF.

Latin American Railways Association, United Nations E/CEPAL/1019, Oct. 1976, 65 pp

ACKNOWLEDGMENT: Latin American Railways Association, United Nations  
ORDER FROM: Latin American Railways Association, Economic Studies Committee, Buenos Aires, Argentina United Nations, Economic Commission for Latin America, New York, New York, 10017

DOTL RP

## 24 173381

**SIXTY YEARS OF SOVIET RAILWAYS**

A detailed historical account of the development of railway transport in the USSR. In 1976, freight traffic totalled nearly 3.3 trillion ton/km, and passenger traffic reached 315 billion passenger/km, over a network with 130,000 km of lines. This is equivalent to nearly 10 million tonnes of freight and 10 million passengers carried daily. The article also gives a detailed account of the latest achievements and technical progress made by Soviet Railways in all sectors, and describes the main trends in further development defined in the 10th five-year plan for the coming years.

Pavlovskyi, IG *Rail International* No. 12, 1977, pp 597-612

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

## 24 173472

**ST. LOUIS RAILROAD GATEWAY TERMINAL RESTRUCTURING PROJECT--PHASE I**

This report documents the analyses and results of Phase I of the St. Louis Terminal Restructuring Project. Phase I has been limited to the development and preliminary examination of a physical restructuring plan with order-of-magnitude costs. This physical restructuring plan for the St. Louis terminal area has been developed by a Technical Advisory Committee (TAC) composed of representatives of the seventeen railroad companies operating in the St. Louis terminal. The TAC's restructuring plan would provide for expansion of one classification yard, construction of a new classification yard, modification of an existing yard for industry support, construction of a TOFC/COFC facility, and mainline corridor upgrading.

Railroad bridge upgrading would be an option for further analysis. The TAC's restructuring plan would be refined through substantial additional analysis in Phase II of the project. The primary community impacts of the restructuring plan would be the release of approximately 800 acres of riverfront land for redevelopment and relocation of approximately seventy dwellings and commercial/institutional structures.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, Washington, D.C.

Lewis, DC Hillegas, BD Miller, SM Anderson, C  
CONSAD Research Corporation, Kaiser Engineers, Federal Railroad Administration Final Rpt. FRA/OPPD-78-6, Dec. 1977, 236 pp, 3 App.  
Contract DOT-FR-65181

ACKNOWLEDGMENT: FRA, NTIS

ORDER FROM: NTIS

PB-278139/AS, DOTL RP

## 24 173608

**ROUTE DEVELOPMENT FOR HIGH-SPEED RUNNING: HELPING TO IMPROVE THE DB'S MARKET POSITION**

The article gives a comprehensive description of the route developments being undertaken by the DB. State financing and project evaluation by means of cost-use analysis are examined by way of the concept of "Development routes" in connection with Federal transport route planning. Discussion of the technical fundamentals shows that upon completion of the work the developed routes will be up to the future standard for main traffic routes. Apart from describing the capacity-increasing measures, the author gives special attention to the steps taken to permit a speed increase to 200 km/h. The minimum route parameters, the requirements to be met by structures and permanent way, and the updating and enlargement of the signalling equipment are discussed. The author concludes with the hope that the efforts to overcome other infrastructural defects of the DB will be continued. [German]

Linkhagner, W Mohr, H *Eisenbahntechnische Rundschau* Vol. 26 No. 12, Dec. 1977, p 825

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

## 24 173796

**HIGH SPEEDS ON THE SNCF: OBJECTIVES, MEANS, RESULTS**

In this paper, dedicated more specifically to the French National Railways--but the principles and methods apply everywhere--the author describes two stages in increasing the speed of the trains. The first stage, realised between 1966 and 1976, whose technical and economic validity obtained the sanction of experience, has permitted to make the 200 km/h speed level operational, with the aid of traditional means; heavy train sets with electric locomotive traction. The second stage, now in progress, aims at a speed level of 270 km/h, with the possibility of increase to 300 km/h, and operates on conventional track, which is reserved exclusively to high speed traffic by electric multiple units, specially designed in regard to stability, aerodynamics, traction, braking and comfort.

Portefaix, A (French National Railways Company) *Rail International* No. 1, Jan. 1978, pp 31-49, 15 Fig.

ORDER FROM: ESL

DOTL JC

## 24 174041

**A REVIEW OF THE FEDERAL ROLE IN TRANSPORTATION LABOR PROTECTION**

The growing role of the federal government in development of labor protection programs for transportation workers is examined. Attention is given not only to the rationale and nature of these employee support programs, but also to their impact on transportation. To assure the future viability of transportation systems, the government must use the leverage it possesses in creating these guarantees to require labor to make concessions on work rules and operating practices. The possibility of phasing out the job support programs should be considered while emphasizing federal programs aimed at retraining and placing transport workers in other industries.

Lieb, RC (Northeastern University) *ICC Practitioners' Journal* Vol. 45 No. 3, Mar. 1978, pp 333-341



ORDER FROM: Association Interstate Commerce Comm Practitioner, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

24 174042

## THE FUTURE OF THE MILWAUKEE ROAD

The Milwaukee Road has been financially weak for over a half century. Its attempts at merger have been rebuffed. Investment in net loss branch lines and in many low-density mainlines and yards is the underlying cause of the low earning power. Some coordination with parallel railroads has been achieved but the line abandonment procedures of the Railroad Revitalization and Regulatory Reform Act of 1976 are more restrictive than those of the prior law which has inhibited Milwaukee from large-scale branch line abandonment.

Conant, M *ICC Practitioners' Journal* Vol. 45 No. 3, Mar. 1978, pp 280-298, 3 Tab.

ORDER FROM: Association of Interstate Commerce Comm Pract, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

24 174111

## MEASURING THE PERFORMANCE OF TRANSIT SYSTEMS

This paper reviews the need for the development of transit performance measures, in the light of recent legislation and public subsidy issues for public transportation in the United States. An evaluation framework is presented, which defines and distinguishes between the efficiency, effectiveness and impact of public transit efforts. The application of this framework in evaluating public transit investments, and the use of the performance measures obtained through the application of this framework, in the allocation of funds among systems is then discussed. Research needs with respect to data collection requirements, cross-jurisdictional comparability, and the utility of the proposed performance measures for decision-making are finally addressed. /TRRL/

Dajani, JS (Stanford University); Gilbert, G (North Carolina University) *Transportation Planning and Technology* Vol. 4 No. 2, Jan. 1978, pp 97-103, 1 Fig., 1 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-230951)  
ORDER FROM: ESL

24 174217

## CN INVENTORY CONTROL MODEL

A set of programs monitors stock levels and sets economic reorder points and quantities for 65,000 items of CN's 110,000 item stores system.

Direct requests to Manager, Operational Research, Canadian National Railways.

Canadian National Railways Mar. 1978, n.p.

ACKNOWLEDGMENT: Canadian National Railways  
ORDER FROM: Canadian National Railways, P.O. Box 8100, Montreal, Quebec H3C 3N4, Canada

24 174343

## STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. RAILROAD RATIONALIZATION: BACKGROUND STUDY OF THE MIDWEST

Rapid increases in costs, particularly the cost of capital and of freight cars, continue to make a midwest rail crisis likely. This report endeavors to show what the railroads and the federal government can and should do to restructure this rail system into a viable business enterprise. The report's recommendations are based upon studies of aggregate financial, operating, and marketing information for CRIP, MILW, C&NW, ICG, BN, ATSF SOO, and MP, focussing on the region between Chicago, Milwaukee, Twin Cities, Omaha, Kansas City, and St. Louis. Rationalization of operations and facilities in this region could, if combined with traffic growth, restore the financial health of railroads in this region. The report provides estimates of the likely potential for improvements resulting from a number of rationalization possibilities. A separate chapter is devoted to the Chicago-Omaha corridor, frequently cited as a glaring example of the need for line consolidation.

Prepared for the Program of University Research of the U.S. Department of Transportation.

French, PW Brigham, T Brown, T Martland, CD Sussman, JM

Massachusetts Institute of Technology Final Rpt. Vol. 22 MIT-R77-14, Apr. 1977, 209 pp, Figs., Tabs., 7 Ref., 1 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139

DOTL RP

24 174345

## STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. RAILROAD RATIONALIZATION METHODOLOGY

Railroads can strengthen their competitive and financial position through a program of rationalization that improves service levels or increases operating efficiency. Nevertheless, rationalization proposals are difficult to implement because the various interest groups perceive different costs and benefits, a situation that leads to protests, delay, and perhaps cancellation. This report presents a methodology designed to promote a more effective planning process. The methodology includes a conceptual framework, a set of planning guidelines, a recommended planning procedure, and a review of supply and demand models. By using this methodology, railroads will be more apt to find the best rationalization strategy by spending more time on analysis and negotiation and less on non-productive disputes.

Prepared for the Program of University Research of the U.S. Department of Transportation.

Martland, CD Terziev, MN  
Massachusetts Institute of Technology Final Rpt. Vol. 18 MIT-R77-12, Jan. 1976, 147 pp, 7 Fig., 7 Tab., 4 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139

DOTL RP

24 174353

## STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. A FRAMEWORK FOR EVALUATING THE IMPACTS OF RAILROAD LINE CONSOLIDATIONS

This report develops a methodology for investigating the cost and service impacts arising from the consolidation of parallel railroad main lines. Intense federal interest in consolidations and lack of published evidence to substantiate or refute their value to railroads has intensified a need for such a methodology. The methodology identifies the major impacts to be investigated, estimates (where possible) their probable or maximum magnitude, and organizes a coordinated 13-step procedure for evaluating consolidation alternatives in detail. It includes screening criteria for selecting alternatives to be analyzed and it identifies useful models and sources of data. Two of the more important conclusions are that (1) the net benefits of many consolidations will prove disappointing because substantial traffic often must remain on the downgraded line to serve local industry or make connections to other trains, and (2) that line rehabilitation costs avoided or incurred under a consolidation plan may dominate all other impacts. It follows that a procedure should analyze traffic flows as well as link volumes and that it should test several rehabilitation and investment strategies.

Prepared for the Program of University Research of the U.S. Department of Transportation.

French, PW  
Massachusetts Institute of Technology Final Rpt. Vol. 20 MIT-R76-46, Oct. 1976, 270 pp, Figs., Tabs., 1 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

24 174378

## INTERCITY DOMESTIC TRANSPORTATION SYSTEM FOR PASSENGERS AND FREIGHT

No Abstract.

Prepared at the request of Warren G. Magnuson, Chairman, Committee on Commerce, Science, and Transportation for the use of the aforementioned committee.

Government Printing Office 1977, 464 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

24 174631

**RAILROAD MANPOWER ADJUSTMENTS TO TECHNOLOGICAL CHANGE THROUGH COLLECTIVE BARGAINING: CREW CONSIST ON THE ILLINOIS CENTRAL RAILROAD**

Industries adjust work-force size to technological change and economic changes, but the number of brakemen on railroad crews is inflexibly fixed by labor agreements. In the 1959 crew consist dispute the railroads claimed authority over crew size, the issue remaining unresolved in 1977 despite years of negotiation, mediation, arbitration, and government factfinding. Government-imposed arbitration authorized crew reductions in 1964-5 but granted the current employees job protection, whereupon some railroads offered severance pay. Railroad wages are negotiated industry-wide, but in 1966 a court ruled that crew agreements be on individual railroads, enabling union bargaining power to gain its goal of two brakemen per crew. This dissertation emphasizes a case study of the Illinois Central Railroad, the union's most aggressive opponent.

Doctoral thesis. Prepared in cooperation with United Transportation Union, Cleveland, Ohio., and Association of American Railroads, Washington, D.C.

McCabe, DM

Cornell University, United Transportation Union, Association of American Railroads, Manpower Administration Final Rpt. DLMA-91-36-76-04-1, May 1977, 718 pp

Grant DL-91-36-76-04

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-274484/5ST

24 176663

**THE MOTOR-CARRIER INDUSTRY**

The introduction and glossary provide a general background of the trucking industry, defining terminology and giving reference and statistical material useful in considering individual case studies. The major portion of the book contains nine case studies of actual company situations and management decision-making processes. Some company names have been disguised. Vital decisions that affected the overall competitiveness of the firms, primarily operating policies, are stressed.

Wyckoff, DD (Harvard University); Maister, DH (British Columbia University, Canada)

Lexington Books 1977, 191 pp, Figs., Tabs., 2 App.

ORDER FROM: Lexington Books, Heath (D.C.) and Company, Lexington, Massachusetts

DOTL TEA 520.W932

24 176876

**FEC: PRODUCTIVITY SHOWCASE**

While labor productivity has received primary attention in the restructuring of the Florida East Coast over the past 15 years, the management says that equipment utilization, made possible by the operation of short, fast trains with two-man crews, is a major source of savings. Unconventional operating methods, an unusually high spending level for track maintenance, low rates made possible by its operations are all cited as means by which the industry in general could benefit.

Miller, LS *Railway Age* Vol. 179 No. 9, May 1978, pp 40-42, 1 Phot.

ORDER FROM: ESL

DOTL JC

24 176883

**THE GERMAN FEDERAL SINKS DEEPER INTO TROUBLE: I AND II**

Confronted with mounting deficits and a declining market share of both freight and passenger movement within West Germany, German Federal Railway is reporting it will be unable to balance its books by 1985 as it has been directed by the Federal Government. Even the publicly announced deficit does not include a very large Federal compensation and support under various programs including maintenance of low local passenger fares, railway pensions, interest on loans for postwar reconstruction, and other Federal subsidies. Large-scale line abandonments, closing of local passenger services, reduction in labor costs through investment, and more equitable terms of competition between the principal transport modes are all being implemented or advocated. Passenger service will be concentrated on major

intercity routes; freight services will be completely recast with unit trains and classification yard consolidations; computerized data processing and new operational controls are being instituted with the most elaborate computer applications on any railway.

Part 2 of this article in *Modern Railways*, Volume 35, No. 355, April 1978, pp 177-179.

Allen, GF *Modern Railways* Vol. 35 No. 354, Mar. 1978, pp 112-115, 6 Phot.

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

DOTL JC

24 176903

**U.I.C.**

A series of articles on the International Union of Railways, its aims and objects; the work of H.Q. departments, including the Documentation Centre; UIC Committees; its role in coordinating international research; Intercontainer; and Interfrigo.

*International Railway Journal* Feb. 1978, 17 pp

ACKNOWLEDGMENT: British Railways

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

DOTL JC

24 178138

**BAM PIERCES THE PERMAFROST**

With the important Berkakit branch now open for traffic, the Baikal-Amur Magistral is already making a significant contribution to opening-up the mineral-rich Yakutia region.

*Railway Gazette International* Vol. 134 No. 4, Apr. 1978, pp 206-208, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

24 178290

**DB HAS INCREASING DIFFICULTIES IN ESTABLISHING EFFICIENT TARIFFS [Effiziente Preisgestaltung der DB Zunehmend schwieriger]**

When devising appropriate tariff measures aimed at reacting quickly to market requirements, the DB's task is made particularly complex by various pressures of an economic order. Owing to serious distortions in the conditions of competition, the railway is finding it increasingly difficult to fulfil its corporate-economy obligations. The time has seemingly come for the costs borne by the various carriers to be explained objectively. [German]

*Verkehrswissenschaftliche Informationen* N20-21, 1977, pp 38-42, 19 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Verkehrswissenschaftliche Informationen, Frankfurt am Main, West Germany

24 178424

**TWO-YEAR REPORT ON THE NORTHEAST CORRIDOR**

The Northeast Corridor Improvement Project, a major public investment in improved intercity passenger transportation, is analyzed. Results of the Amtrak operations in the Corridor in 1976 and 1977 are presented. Amtrak projections for the Corridor during the period of construction and facilities supporting improved service goals are described. The report establishes a framework for comparing service options after NECIP completion; describes the social and economic implication and public costs and benefits of still further improvement; and evaluates possible rail responses to such additional transportation needs.

Department of Transportation Feb. 1978, 103 pp, Figs., Tabs., Refs., 11 App.

ACKNOWLEDGMENT: DOT

ORDER FROM: GPO

DOTL RP

24 178452

**THE FIVE "W'S" OF RAILROAD RESEARCH**

The roles of the Federal Railroad Administration, Association of American Railroads and of individual railroads in research are discussed. While

concentrating on near-term research results, the author urges that FRA, AAR and industry must cooperate in setting mid-and far-term goals if the railroad industry is to continue to operate in the private sector. The specific problems which an individual railroad's research program can address are illustrated by descriptions of Southern Railway's efforts along with characteristics of the road's plant, traffic and operations which make its problems somewhat different from the industry generally. Among Southern's developments are rail research test vehicles, pulsating load equipment, car rocking laboratory, automatic rail wear inspection process, and electronic speed recorders.

Simpson, WW (Southern Railway) *Progressive Railroading* Vol. 21 No. 6, June 1978, p 43, 6 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

## 24 178540

### THE EIGHTIES: A NEW RAIL ERA--PROCEEDINGS OF THE BIENNIAL CIGGT SEMINAR ON RAILWAY RESEARCH

This is the proceedings of a conference on railway research sponsored by CIGGT on January 29 and 30, 1978. The following are included: Railway Electrification Panel; Passenger Service Panel; Track Systems and Rolling Stock: A Light, Steerable Axle Truck for Rail Passenger Vehicles, G. Soblewski and D. Gilmore; the Dilemma of Passenger Rail in Canada, J. Lukasiewicz; Surface Freezing of Coal Cars, P.H. Oosthuizen; Reduction of Impact Damage in Automatic Marshalling Yards, C.N. Kerr; Problems of Track Support, G.P. Raymond. Cost and Economics: Railway Costing Through the Looking Glass, P.M. Bunting; Costing Track Wear, M.D. Roney; Costing Rail Wear with Replacement Value, C. Schwier and R.W. Lake; Railway Cost Estimation Under Peak-Loading Conditions, J.M. Hartwick and J.T. Bernard; Econometric Forecasting of Railway Freight Demand, G.R. Sparks. Propulsion, Communications and Control: Linear Induction Motors for Transit Systems, G.E. Brown; Linear Synchronous Motor Propulsion for Urban Systems, G.R. Slemon; Guided Radar for Obstacle Detection on the Railways, N.A.M. Mackay, A. Benjamin and D.J. Clarke; Inductively Coupled Signal Transmission for Long Freight Trains, G.J.M. Aitken. Operations Analysis: An Analytic Model for the Analysis of Congested Railway Lines, G.W. English; A Line Capacity Model, E.R. Petersen; Computer Simulation of Derailment During Grade Crossing Collisions, D.B. Cherchas, et al; Spinality in Transportation Networks, F.E.F. Dunford and E.R. Corneil; Project Control Using Network Analysis, M.C. Lockhart and C.E. Law. Freight Systems: An Arctic Railway--1977 Perspective, R.G. Maughan and R.W. Lake; The Ferchibal Transportation Study, P. Charron and Leclerc; Costing the Transportation of Western Canadian Coal to Thunder Bay, C.J. Boon; Advanced Systems: Development of the Train Location, Identification and Control System, R. Pomeroy; Testing and Evaluation of the Prototype LRC Passenger Train Equipment, I. Tomaka and P.L. Eggleton; A Systems Approach to the Development of an Intermediate Capacity Transit System, R. Giles; Status of Magnetically Levitated High-Speed Guided Ground Transportation, N.E. Rudback, A.R. Eastham and W.R. Hayes; Shinkansen--The Japanese "Bullet" Train, C.E. Law. Panel on Research and Development for the 80's.

This is the proceedings of a conference sponsored by CIGGT on railway research, held January 29-30, 1978.

Lake, RW Schwier, C Arnold, SN  
Canadian Institute of Guided Ground Transport Proceeding  
CIGGT-78-5, Apr. 1978, 472 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

## 24 178542

### FIGHTING TO WIN FINANCIAL STABILITY

A new freedom to raise rates and to investment in commercial development to raise passenger traffic has been given Japanese National Railways. Tighter management has checked escalation of the deficit and drastic measures to put freight business on a commercial basis are planned. An interview shows how this immediate strategy fits into the long-term objective of a stable and rational financial structure for JNR. Commercial and social aspects of the business are being analyzed and specific proposals will be ready for the government within two years.

Hope, R *Railway Gazette International* Vol. 134 No. 5, May 1978, pp 283-286, 2 Phot.

ORDER FROM: ESL

DOTL JC

## 24 178544

### RENOVATING THE TOKAIDO SHINKANSEN

In more than 13 years, the 515-km New Tokaido Line has carried 1.2 billion passengers without a fatality; cars have operated about 6 million km each; and track has seen the passage of about 400 million gross tons. Replacement of the original 53-kg/m rail with 60-kg/m rail will be completed by 1982; new rolling stock is being delivered; and by 1985 all catenary will have been replaced with a heavy-compound design.

Kimigafukuro, SI (Japanese National Railways) *Railway Gazette International* Vol. 134 No. 5, May 1978, pp 299-300, 1 Fig., 2 Phot.

ORDER FROM: ESL

DOTL JC

## 24 178553

### GRAIN AND RAIL IN WESTERN CANADA

This is a statistical appendix to the two preceding volumes which report the conclusions of research on evaluation of grain transportation and handling systems in western Canada. An inventory of branch lines in the region; revenues and losses associated with grain traffic; volume of grain traffic; elevator activity and receipts; and similar data are presented.

Report of the Grain Handling and Transportation Commission, Government of Canada. See also Volume 2, RRIS 24 172636; Bulletin 7802.

Ministry of Supply and Services, Canada Vol. 3 1977, 92 pp, Tabs.

ACKNOWLEDGMENT: Ministry of Supply and Services, Canada  
ORDER FROM: Ministry of Supply and Services, Canada, Printing and Publishing, Ottawa, Ontario K1A 0S9, Canada

DOTL RP

## 24 178554

### GRAIN AND RAIL IN WESTERN CANADA

This volume contains the conclusions of a research program carried out to evaluate grain transportation and handling systems in western Canada. There are recommendations on abandonment and retention of grain-related prairie branch lines. It presents recommendations on car utilization, car allocation, private cars, subsidies and retention of abandoned right-of-way. Recommendations are also made on the elevator and port facilities associated with grain movement, and on industrial development related to farm products in the grain areas. Actions are also recommended for various government agencies.

Report of the Grain Handling and Transportation Commission, Government of Canada. See also Volume 2, RRIS 24 172636; Bulletin 7802.

Ministry of Supply and Services, Canada Vol. 1 1977, 545 pp, Figs., Tabs.

ACKNOWLEDGMENT: Ministry of Supply and Services, Canada  
ORDER FROM: Ministry of Supply and Services, Canada, Printing and Publishing, Ottawa, Ontario K1A 0S9, Canada

DOTL RP

## 24 178924

### BODINI TURNS FEPASA INTO A TRAINLOAD RAILWAY

Drastic action taken over the past two years by President Walter Bodini has rid Fepasa of almost all of its long-distance passenger trains and general freight; priority is now given to movement of only 12 commodities in block trains between bulk loading and unloading depots. Brazilian transport consultant Theodor A. Gevert shows how Bodini's policies, which include cutting staff by one-third, have put Fepasa on the road to financial recovery.

Gevert, TA *Railway Gazette International* Vol. 134 No. 4, Apr. 1978, pp 212-214

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

## 24 178943

### THE CREW SIZE DISPUTE IN THE RAILROAD INDUSTRY

No Abstract.

McCabe, DM  
Cornell University FRA-OPPD-77-13, 1977, 693 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications  
ORDER FROM: FRA

24 178950

**14TH ANNUAL RAILROAD ENGINEERING CONFERENCE  
PROCEEDINGS, "R&D AND RAILROADING: 1977"**

This report constitutes the proceedings of the three day railroad engineering conference held at the University of Southern Colorado on October 18-20, 1977. Conference papers were presented from the Federal Railroad Administration, Office of Research and Development, the railroad industry, and the Association of American Railroads. Generally, the papers covered a review of the R&D activities in the railroad industry during 1977. A tour of the Transportation Test Center Facilities was also included.

Federal Railroad Administration Proceeding Mar. 1978, 418 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-283785/AS, DOTL NTIS

24 179109

**STUDY OF THE FEASIBILITY OF A REGIONAL RAILROAD  
SYSTEM FOR NORTHWEST PENNSYLVANIA**

The impetus for this study is the concern for preservation of local railroad service in predominantly rural areas. The concept of an independent regional short-line railroad system was considered and thoroughly analyzed. The eight-county northwest Pennsylvania region was used as a basis for determination of the commercial and financial feasibility of an independent short-line system. Nine possible short-line railroad configurations were formulated and analyzed in terms of anticipated revenue, annual operating and non-operating expenses, and capital costs. The study also examined existing and potential sources of funding available through local, state, and Federal government programs, as well as various ownership alternatives for a short-line railroad system. The data sources and analytic procedures

utilized are thoroughly documented so as to facilitate applications to other areas facing loss of railroad freight service.

Performed under subcontract to: Northwest Pennsylvania Regional Planning and Development Commission, Franklin, Pennsylvania.

Matzzie, DE Feder, R

CONSAD Research Corporation Final Rpt. DOT-TPI-10-77-27, Sept. 1977, 157 pp, Figs., Tabs., 5 App.

Contract DOT-OS-60003

ACKNOWLEDGMENT: DOT  
ORDER FROM: NTIS

DOTL RP

24 179160

**TECHNOLOGY ASSESSMENT SETS TOMORROW'S RESEARCH  
TARGETS**

The upsurge in railway research during the 1960's was mainly concerned with hardware. Numeracy had to replace empiricism because severe competitive pressures forced the rail mode out of its comfortable rut of evolutionary development. Important gains have been made, particularly in the area of vehicle/track interaction but it is clear that guided transport is still a long way short of the limits of technical stretch as regards speed, capacity, and economic performance. The process of technology assessment in which possible operational and technical advances are matched to commercial opportunities, can provide a framework for the planning of long-term research.

Wickens, AH *Railway Gazette International* Vol. 134 No. 4, Apr. 1978, pp 195-200, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

25 167048

## TRANSPORTATION INVESTMENT REQUIREMENTS AND GROWTH PATTERNS IN MICHIGAN

The purpose of the research was to develop a transportation supply-demand model for use in statewide transportation planning in Michigan. This model was to be utilized to determine the transportation investments required to attain certain levels of transportation services for alternative demographic growth patterns for the state.

Taylor, WC McKelvey, FX Berridge, D Carrick, JT Witkowski, JM

Michigan State University, East Lansing, Department of Transportation  
Final Rpt. DOT-TST-77/49, May 1977, 268 pp

Contract DOT-OS-50044

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-270974/9ST, DOTL NTIS

25 167390

## DEVELOPING LOCAL STRATEGIES AS ALTERNATIVES TO ABANDONMENT OF LIGHT DENSITY RAILROAD LINES

The report provides technical documentation of the research methodology which was developed and employed in order to produce a manual entitled 'Handbook for Preservation of Local Railroad Service'. That document is intended to assist shippers, local and state governmental units, and planners, in their efforts to maintain Class I branch line service or investigate shortline railroad alternatives to such Class I branch line service. Approaches which were considered are grouped generally into two categories: Those which are designed to assure the continuation of currently existing service; and those which will result in a newly-formed independent railroad operation. Discussions of each specific alternative are enhanced by the provisions of case study information where appropriate, and a variety of ideas are presented which relate to the economics of light density rail line operations. In addition, the Handbook provides its readers with a rather unique method for the estimation of railway operating costs which are relevant to the independent railroad alternative.

See also report dated Jan 77, PB-272 458.

Patton, EP Langley, CJ

Tennessee University, Knoxville, Department of Transportation Final Rpt. DOT/TST-77/71, TC-76-022, Mar. 1977, 318 pp

Contract DOT-OS-50125

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273071/1ST

25 169081

## HINDRANCES TO COORDINATING TRANSPORTATION OF PEOPLE PARTICIPATING IN FEDERALLY FUNDED GRANT PROGRAMS. VOLUME II--CASE STUDIES

GAO studied transportation projects in 12 locations to determine the extent of coordination achieved by each project, the circumstances that made coordination possible, and the hindrances that impeded coordination.

Volume I in RRIS 25 169082; RRIS Bulletin 7802.

General Accounting Office CED-77-119-Vol-2, Oct. 1977, 177 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272838/4ST

25 169082

## HINDRANCES TO COORDINATING TRANSPORTATION OF PEOPLE PARTICIPATING IN FEDERALLY FUNDED GRANT PROGRAMS. VOLUME I

GAO identified 114 Federal programs that provide financial assistance for the transportation of people. GAO did not identify any express statutory or regulatory restrictions that specifically prohibit coordination of transportation resources of these programs but did identify a number of hindrances to coordination. The most significant hindrance appears to be confusion at all government levels about the extent of transportation coordination federally funded projects may engage in. The Congress should reduce this confusion by endorsing transportation coordination when feasible, providing there is appropriate cost-sharing and cost and service accountability.

Volume II in RRIS 25 169081; RRIS Bulletin 7802.

General Accounting Office CED-77-119-Vol-1, Oct. 1977, 158 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-272837/6ST

25 169621

## GOVERNMENT-INDUSTRY COST-SHARED CONTRACTS

Government-industry cost-sharing is defined as basic research, applied research, and development projects in which the costs and efforts are shared by both parties (not necessarily equally) through specific contractual arrangements. Potentially, it is a powerful tool both for the development and the diffusion of new technology. The purpose of the study was to find, identify, and describe all of the government-industry cost-shared basic research, applied research, and development contracts for the five fiscal years of 1969 through 1973 in the six Departments of Agriculture, Commerce, HEW, Interior, Labor, and Transportation. After the contracts were found and identified, interviews were conducted with the government Contracting Officer and the Contracting Officer's Technical Representative for each of the contracts to determine the origin and status of the government-industry relationship, the objective of the contract, the nature of the technical problem, and the results of the contractual effort. Finally, interviews were conducted with a selected sample of the industry cosponsors to obtain indications of industry's use of the results and industry's view of the efficacy of cost-sharing as an incentive to technological innovation.

Manalytics, Incorporated, National Science Foundation NSF/RA/R-75/032, July 1975, 100 pp

Contract NSF-C-890

ACKNOWLEDGMENT: NTIS

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PB-273010/9ST

25 170400

## TRANSPORTATION RESEARCH NEEDS RELATED TO SOCIAL, ECONOMIC, AND ENVIRONMENTAL ISSUES

This report presents research problem statements (intended to help provide guidance to government agencies, research institutions, industry, universities and others in allocating funds and manpower), six workshop statements, and comments dealing with research needs. The research problem statements cover the following areas: citizen participation; economic and social aspects; engineering economic analysis; freight movement; intermodal freight; pricing; surface freight regulation; and urban goods movement. The workshop papers cover the need for research in industry and government; the social, economic and environmental field; transportation in the rural sector; and transportation energy conservation.

*Transportation Research Circular* No. 187, Dec. 1977, 41 pp, 1 Fig., 46 Ref.

ORDER FROM: TRB Publications Off

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25 170944

## PRIVATE TRANSPORT. PUBLIC TRANSPORT [Individualverkehr. Öffentlicher Verkehr]

The author, by means of in-depth analysis of transport development in Austria, concludes that private car transport has reached a saturation point, so that more rational organization of public transport is required, bearing in mind the particular characteristics of each mode of transport. Area transport should be restricted to buses, and "linear" transport, with a properly adapted rail network, to the railways.

Krawina, J *Verkehrsannalen* Vol. 24 No. 3-4, Oct. 1977, pp 117-149, 9 Tab., 87 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Verkehrsannalen, Gauerannngasse 4, Vienna 100, Austria

25 172426

## EVALUATING OPTIONS IN STATEWIDE TRANSPORTATION PLANNING/PROGRAMMING--ISSUES, TECHNIQUES, AND THEIR RELATIONSHIPS

This report summarizes the key issues facing state planners, identifies impacts resulting from alternative solutions to the issues, describes available techniques to measure impacts, and reports data availability to apply the selected techniques. A list of approximately 75 specific issues were sorted in 11 major areas within which states must make key transportation decisions: revenue shortfall; development and multimodal transportation policies, plans and programs; organization and management; coordination with other

state and regional programs; development of energy policy, plan and program; relationship between transportation improvements and developments; major corridor improvements; cost-effectiveness in highway standards and maintenance; improvement/abandonment of rail service; funding transit services and improvement; airport capital improvement. Information most relevant in addressing these issues was grouped in seven fields of impact: environmental, social economic, travel, development, legal/administrative/institutional/financial, plan and program evaluation. These same fields were used to classify the techniques.

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with Federal Highway Administration.

Bellomo, SJ Mehra, JJ (Planning Environment International);

Stowers, JR Cohen, HS Petersilia, MR Rena, AT (System Design Concepts, Incorporated) *NCHRP Report* No. 179, 1977, 91 pp, 3 Fig., 20 Tab., 5 App.

ORDER FROM: TRB Publications Off

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## 25 172628

### THE RRRR ACT-SOME IMPLICATIONS FOR RAILROAD RATE BUREAU

Three fundamental changes in Interstate Commerce Commission procedures seem to be required by the Railroad Revitalization and Regulatory Reform Act of 1976. Discussed are the 120-day rule mandating prompt action on rail ratemaking actions; freedom of individual lines to take rate actions without "bureau constraints"; and restrictions on interline ratemaking proposals only to those lines which can practically participate in the proposed rates.

Rooney, GJ (Santa-Fe Railway) *Transportation Journal* Vol. 17 No. 2, Dec. 1977, pp 17-31, 1 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

## 25 172639

### RAIL MERGER STUDY

This final report recommends that the Interstate Commerce Commission adopt a statement spelling out the policies which it intends to follow in all future rail consolidation cases. It advocates reliance on negotiation among the merger parties, with a minimum of government involvement in the prerogatives of rail management, while assuring that the public's stake in a sound and efficient rail system is preserved. It is concluded that mergers are not a panacea for all of the rail industry's problems but can be valuable for railroads to consider in evaluating their future. It is believed that improvements resulting from rate restructuring, innovative marketing, enlightened management, labor reform and responsible governmental action are necessary if the long-range problems of the industry are to be solved.

Interstate Commerce Commission Final Rpt. Feb. 1978, 65 pp, 1 App.

ACKNOWLEDGMENT: Interstate Commerce Commission

ORDER FROM: Interstate Commerce Commission, Rail Services Planning Office, Washington, D.C., 20423

DOTL RP

## 25 173181

### IMPACT OF TRANSPORTATION-FACILITY DETERIORATION AND ABANDONMENT

Five studies of the effects of lack of funds for normal maintenance of transportation facilities were discussed in a conference session. In Pennsylvania, a fiscal-review task force has made recommendations in the areas of program, funding, and management and policy studies. The most important of these is that highway maintenance, rather than new construction, should receive first priority. A Federal Highway Administration survey has found that although highway travel has increased in the last 6 years, the highway capital-improvement program has decreased, and new highway capacity will soon be needed. A system was developed in Ohio for measuring the condition (or stage of deterioration) of a highway and evaluating the effect of this deterioration on the highway and its users. The process used in New York state for expending available federal railroad subsidies, selecting the variables in the analysis, and evaluating their weights is described. Maintenance models that predict the demand for maintenance and maintenance impacts and a maintenance-management system were developed for the state of Massachusetts. /Author/

This article appeared in Transportation Research Record No. 634, Predicting and Measuring Impacts of Transportation Systems.

Gamble, HB (Pennsylvania State University, University Park) *Transportation Research Record* No. 634, 1977, pp 1-6, 1 Fig.

ORDER FROM: TRB Publications Off

## 25 173187

### IMPACT OF RAILROAD ABANDONMENT ON RURAL HIGHWAYS (ABRIDGMENT)

This paper addresses the problem of how a shift in transportation demand, which could result from the abandonment of a branch rail line, might affect the roads of a rural area. The paper introduces an evaluative methodology that can be used to estimate the impact of rail-service discontinuance on rural highways and bridges. Two areas in Indiana that were faced with possible loss of direct rail service were investigated with respect to the impact that abandonment would have on local highways and bridges. Results of these studies indicate that the abandonment of lightly used branch lines does not have as great an impact on rural highways as some highway and railroad interest would like to believe. Many of the rail facilities that have been proposed for abandonment in the Northeast and Midwest do not carry sufficient traffic volumes to cause significant impacts on nearby highways if service along these lines were discontinued.

This article appeared in Transportation Research Record No. 634, Predicting and Measuring Impacts of Transportation Systems.

Purnell, LO Yoder, EJ Sinha, KC (Purdue University) *Transportation Research Record* No. 634, 1977, pp 39-40, 1 Ref.

ORDER FROM: TRB Publications Off

## 25 173443

### PROBLEMS OF IMPLEMENTING TRANSPORT INFRASTRUCTURE PLANS [Vollzugsprobleme der Verkehrswegeplanung]

Taking as a basis the example of Federal German trunk road plans, which were brought up-to-date in 1975, The author illustrates that a multitude of occurrences happen during the implementation of a plan, which may severely restrict the decision margins. He studies this problem of planning flexibility by showing that the difficulties of executing long-term general plans have hardly been touched upon to the present day. [German]

Bohne, E *Zeitschrift fuer Verkehrswissenschaft* Vol. 48 No. 3, 1977, pp 135-155

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hellendoorn (A) Verlag, Stettiner Strasse 1, Postfach 78, 4442 Bentheim 1, West Germany

## 25 173991

### MASSACHUSETTS STATE RAIL PLAN

The Massachusetts State Rail Plan, 1975 Edition, was prepared as part of the Commonwealth's efforts to respond to the railroad restructuring process set in motion by the Regional Rail Reorganization Act of 1973 (3R Act). At that time, the pressing need facing the Commonwealth was the immediate impact of the abandonment of branchlines excluded from the Final System Plan of the United States Railway Association. Thus, where the 1975 edition concentrated on the development of a proposed branchline assistance program for the continuation of essential freight rail services and the preservation of transportation corridors, this edition explores some of the results of the first steps in the Commonwealth's efforts to carry out its proposed plans.

Massachusetts Exec Office of Transp & Construction PUB-913187-375-976CR, Aug. 1976, 83 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-273754/2ST

## 25 174183

### NEW YORK STATE RAIL PLAN ANNUAL REPORT

This is the second update of the New York State Rail Plan and provides the status of the Title IV program of the Regional Rail Reorganization Act of 1973 and future programs under similar provisions of the Railroad Revitalization and Regulatory Reform Act of 1976. Chapter I reviews the history and status of the Title IV program. Chapter II indicates the status of all light density rail lines operating under Title IV. Chapter III explains

the Title VIII Program (4R Act) under which the State operates, effective April 1978. The Appendix has maps describing various categories of rail service.

As required by Title IV of the Regional Rail Reorganization Act of 1973, as amended.

New York State Department of Transportation Aug. 1977, 30 pp, 4 Tab., 1 App.

ACKNOWLEDGMENT: New York State Department of Transportation  
ORDER FROM: New York State Department of Transportation, 1220 Washington Avenue, Albany, New York, 12232

DOTL RP

25 174184

## NEW YORK STATE RAIL PRESERVATION PROGRAM ANNUAL REPORT

The State's rail preservation program, discussed in this report, consists of capital and operating assistance projects financed through the \$250 million Rail Preservation Bond issue approved in 1974 and intended to maintain and improve essential rail freight, passenger and commuter service and safety. Matching funds for the program come from Amtrak, Conrail, UMTA, FRA and FHWA Railroad Grade Crossing Program. Major segments of the program are: intercity passenger service; commuter rail service; Long Island freight service; and upstate freight service. Total funds under the programs will total \$955 million.

Prepared in conformance to Chapter 257, Section 8, of the Laws of 1975, as amended by Chapter 460 of the Laws of 1976.

New York State Department of Transportation Sept. 1977, 52 pp, 10 Tab., 3 App.

ACKNOWLEDGMENT: New York State Department of Transportation  
ORDER FROM: New York State Department of Transportation, 1220 Washington Avenue, Albany, New York, 12232

DOTL RP

25 175734

## ORGANIZATION ANALYSIS OF THE REGULATORY PROCESS: A COMPARATIVE STUDY OF THE DECISION MAKING PROCESS IN THE FEDERAL COMMUNICATIONS COMMISSION AND THE ENVIRONMENTAL PROTECTION AGENCY

The report is an analysis of regulatory commissions and how they fit their regulatory policies into the general framework of national economic policy. The study is directed toward answering these questions: (1) Do the independent agencies function in a way which obscures policy questions in favor of ad hoc, incremental judgments; (2) Do executive branch regulatory agencies function by taking a comprehensive, analytic overview of policy alternatives; (3) Do location and structure cause behavioral consequences for an agency; (4) Are there different regulatory functions for independent and regulatory agencies; (5) Is transitional equity and technological change affected by agency location and structure; and (6) Does the concern with location and structure fail to consider the way in which mission affects form and its consequences. The report includes an overview of regulatory activities of the EPA and FCC and four case studies: (1) FCC's specialized common carrier decision; (2) FCC's development of 1972 cable TV rules; (3) EPA's automobile emission standard suspension decision; and (4) EPA's development of effluent guidelines for the beet sugar processing industry. Also included is an analysis and comparison; and an appendix which is a memorandum of law.

Mahony, S Greene, S Hargrove, EC  
Urban Institute, National Science Foundation Final Rpt. NSF/RA-770411, Nov. 1977, 298 pp

Grant NSF-APR75-16718

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277920/5ST

25 176668

## ALLOCATION IN SURFACE FREIGHT TRANSPORTATION: DOES RATE REGULATION MATTER?

This paper reexamines a familiar problem in the literature of transportation economics: the impact of ICC rate regulation on the allocation of surface freight traffic among competing modes. A multinomial logit model is used to estimate the division of traffic in manufactured commodities among truck,

rail boxcar and piggyback. The extent of misallocation attributable to regulatory rate distortion is found to be substantially less than reported in previous studies.

Levin, RC (Yale University) *Bell Journal of Economics* Vol. 9 No. 1, 1978, pp 18-45, 13 Tab., 31 Ref., 1 App.

ORDER FROM: ESL

25 176671

## TRANSPORT POLICY AND ECONOMICS [Politica y economia del transporte]

This is a study on rail transport economy based on energy consumption, where the author endeavours to show the economic advantage of rail over road. To do this, he firstly analyzes the general problem of energy, then develops his study taking as basis the 1971 figures for rail transport in Argentina, and concludes with some proposals for a new Argentine rail policy. [Spanish]

Ortiz Pranno, AO *Boletin ACPF* Vol. 60 No. 251, Nov. 1977, pp 31-64, 4 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Asociacion del Congreso Panamericano de Ferrocarril, Avenida 9 de Julio 1925, Piso 13, Oficina 1301, Buenos Aires, Argentina

25 176675

## TRANSPORT POLICY AND CONSTRAINTS. FUTURE POLICY FOR TRANSPORT [Verkehrspolitik und Sachzwange. Zur Frage moeglicher zukuenftiger Entwicklung im Verkehrsbereich]

Typical of the present transport policy situation is that, despite numerous projects, there is a high degree of uncertainty. Forecasts for transport in 1990/1995 are unreliable. There are at least 13 factors within or outside the transport sector that have an influence on passenger and freight traffic. In a scenario the author takes account of population variations, income per person, mobility, tax levels, environmental and energy problems and economic structures. [German]

Aberle, G *Internationales Verkehrswesen* No. 5, 1977, pp 279-283

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

25 176910

## INTEGRATED LONG TERM PROGNOSIS FOR TRANSPORT DEMAND IN FREIGHT AND PASSENGER TRANSPORT IN THE FEDERAL GERMAN REPUBLIC UP TO THE YEAR 1990. SECTIONAL STUDY: PASSENGER TRANSPORT-GLOBAL DEVELOPMENT UP TO 1990 AND REGIONAL STRUCTURE IN THE YEAR 1990 [Integrierte Langfristprognose fuer die Verkehrsnachfrage im Gueter-und Personenverkehr in der Bundesrepublik Deutschland bis zum Jahre 1990. Teilstudie: Personenverkehr--Globale Entwicklung bis 1990 und Regionale Struktur im Jahre 1990]

The long term forecasts for passenger transport in the federal German republic should be a particularly useful decision aid for the planning of traffic routes. For this reason, with the aid of many methodological assumptions, the global development of passenger transport up to 1980 is estimated, divided in accordance with the reason for the journey and the type of transport (modal). A special prognosis is required for air transport. In addition to the global forecasts, the 79 districts in the federal republic are checked for expected special developments in individual journey purposes and types of traffic and estimates are made up to the year 1990. The study also demonstrates the movement in passenger traffic between the 79 districts, also taking into account the modal split in this case. [German]

*Internationales Verkehrswesen* Analytic Vol. 28 No. 1-2, Jan. 1977, pp 3-8, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-306613), Federal Institute of Road Research, West Germany

ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlerstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany



25 176911

**INTEGRATED LONG TERM FORECAST FOR TRAFFIC REQUIREMENTS FOR FREIGHT AND PASSENGER TRAFFIC IN THE FEDERAL REPUBLIC OF GERMANY TO THE YEAR 1990. PART STUDY: FREIGHT TRAFFIC ANALYSIS AND PROJECTED PLAN.** [Integrierte Langfristprognose fuer die Verkehrsnachfrage im Gueter-und Personenverkehr in der Bundesrepublik Deutschland bis zum Jahre 1990. Teilstudie: Gueterverkehr--Analyse und Projektion]

As a supplement to the forecast for passenger traffic an assessment of global and regional freight traffic in the federal German republic is made up to the year 1990. With the aid of a separately conducted project on social economic key data, the global and regional freight traffic are estimated according to traffic volume and traffic efficiency. The global rise in traffic is transferred to the various means of traffic in a modal split calculation. Separate calculations are carried out for the traffic across borders and through-traffic. In all forecasts the types of goods are combined in 12 categories of goods. Special attention is paid to regional forecasts of traffic and traffic division. Estimates are made regarding the regional inter-linking for the 79 areas of the federal German republic for the year 1990, whereby the development of statistically difficult to assess public freight transport is emphasised in the investigation, since on average 85% of freight transport in 1990 will be handled by public freight transport. [German]

*Internationales Verkehrswesen* Analytic Vol. 28 No. 3-4, Mar. 1976, pp 71-76, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-306617), Federal Institute of Road Research, West Germany

ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

25 176912

**FORECASTS OF POPULATION, ECONOMIC AND TRANSPORTATION DEVELOPMENT AS THE BASIS FOR FEDERAL COMMUNICATIONS PLANNING** [Prognose der Bevoelkerungs-, Wirtschafts- und Verkehrsentwicklung als Grundlagen fuer die Bundesverkehrswegeplanung]

The report is concerned with the work of forecasting and general problems within the framework of the co-ordinated investment programme for federal communications and the necessary preparatory and forecasting activities arising from this planning exercise. Based on general considerations, a description is provided of the forecasting of structure data and of the general development of population, economy and the transport area. In addition explanations are given of the place and processing of the forecasts in the planning process and of further work (diw- interaction matrix) and of the programs (utps and streak) and models. The intricate construction of present day forecasting models abundantly reinforces the need for their improvement, particularly in reference to goods traffic, especially for a European investment policy. [German]

Weber, HP *Internationales Verkehrswesen* Analytic Vol. 29 No. 1, Jan. 1977, pp 7-11

ACKNOWLEDGMENT: TRRL (IRRD-306518), Federal Institute of Road Research, West Germany

ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

25 176919

**PAYING FOR PUBLIC TRANSPORT-THE ETERNAL TRIANGLE**

The paper discusses three variables in public transport planning-level of subsidy, quality of service and level of fares-and their application in London transport, the aim of management being to find the optimum balance of these three elements. The level of subsidy for public transport is often a political decision and is not necessarily at the optimum level for reasons of public expenditure. The question of quality of service is discussed from two aspects, efficiency and effectiveness. Efficiency is defined as minimizing the rate at which resources are consumed while effectiveness is the ability to carry out tasks within the overall objective. The choice of fare level structure is one where political policies sometimes determine fares either as a source of revenue or as a means of encouraging use of public transport. The author discusses these variables of public transport planning in relation to London transport's corporate aims and the duality of decision-making within the Greater London Council.

Robinson, K *Chartered Institute of Transport Journal* Analytic Vol. 38 No. 2, Jan. 1978, pp 35-38

ACKNOWLEDGMENT: TRRL (IRRD-231774)

ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

25 176925

**THROTTLE OPEN OR THROTTLE DOWN. SCENARIOS FOR THE FUTURE OF THE TRANSPORTATION SYSTEM PART I AND II** [Gasgeven of afremmen. Toekomstscenarios voor ons vervoerssysteem. Band I en II]

The book is printed in two volumes. Volume I contains the text, Volume II tables, figures and references per chapter. After an introduction, Volume I is in three parts. Part I describes the methodological background for the study in two chapters: the nature and methods of future research and systems-analysis of mobility. Part II discusses the past, the present and the future of the separate subsystems that make up the passenger transportation system in the Netherlands. The systems are: the motor car system, the air industry, the railway system, local and regional public transport, new systems of public transport, the taxi system, and the unprotected systems. Part III integrates the subsystems into two scenarios for the future of the complete transportation system and analyses the cost and external effects of each. The author prefers the scenario with the emphasis on walking, the two-wheeler and public transportation, and a slower rate of expansion of the motor car and air industry. [Dutch]

Hupkes, G

Uitgeverij Kluwer BV Monograph 1977, 498 pp, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-231881), Institute for Road Safety Research

ORDER FROM: Uitgeverij Kluwer BV, 8 Stromarkt, Deventer, Netherlands

25 178421

**IS THE ADMINISTRATIVE FLEXIBILITY ORIGINALLY PROVIDED TO THE U.S. RAILWAY ASSOCIATION STILL NEEDED?**

This report describes the administrative policies and practices of the United States Railway Association and compares USRA's policies and practices with those of other similar corporations established under Federal law. GAO has recommended strengthened internal controls over administrative expenses and asks that Congress reconsider the enabling legislation to decide whether the flexibility originally granted is still required.

General Accounting Office Cong Rpt. CED-78-19, Feb. 1978, 52 pp, 4 App.

ACKNOWLEDGMENT: General Accounting Office

ORDER FROM: General Accounting Office, Distribution Section, Room 4522, 441 G Street, NW, Washington, D.C., 20548

PB-277382/8ST, DOTL RP

25 179127

**THE DECLINE IN PUBLIC TRANSPORT--CAN WE ARREST IT?**

Article considers some salient aspects of rail transport planning policy, especially that related to the major conurbations in Great Britain.

Millman, R *Planner* Vol. 63 No. 5, Sept. 1977, pp 134-137

ACKNOWLEDGMENT: Planner

ORDER FROM: ESL

25 179131

**THE TRANSPORT POLICY DEBATE-WINNING THE ARGUMENT FOR THE RAILWAYS**

Five categories of public affairs activities; attitude towards, revenue support; benefit of public affairs activities; prospects for the railways.

Paper based on address given to Oxford Weekend Conference on September 24, 1977.

Faulkner, R *Chartered Institute of Transport Journal* Vol. 38 No. 3, Mar. 1978, pp 78-80

ACKNOWLEDGMENT: Chartered Institute of Transport Journal

ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

25 179522

**PASSENGER TRANSPORT AND SOCIAL INTERVENTION**

Reductions in public transport services, increased fares and highway congestion have led to three kinds of intervention: regulation and licensing,



financial support and control and taxation of alternatives. The history and effectiveness of each method are discussed. The basic mechanism for controlling stage and express carriageway bus services is still the 1930 road traffic act, but the concept of cross-subsidisation between routes and runs at different times of the day is now difficult to apply. The 1968 act created new management structures for the bus industry and took large sections into public ownership. It also allowed both bus and rail services to be subsidised. The Railways Act 1974 altered the financial basis to bring the UK in line with EEC practice and widen the scope for the payment of grants to British Rail. Although capital grants become available for new transport infrastructure, it is now unlikely that wholly new commuter systems will be developed. It is concluded that the present decline in public transport usage and operation in the UK will continue because there is no determined application of positive subsidies or control or taxation of alternatives.

Harrison, GA *Chartered Institute of Transport Journal* Vol. 37 No. 9, Mar. 1977, pp 249-250

ACKNOWLEDGMENT: TRRL (IRRD 232082)

ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

## 25 179523

### THE GOVERNMENT AND THE RAILWAYS IN GREAT BRITAIN

The publication of a consultative document on transport policy by the government in April 1976 led to a year of consultations and discussions, and the publication of a white paper in June 1977. The main conclusions are presented and discussed, and in the context of the general government approach to transport its policy for the railways is summarised. Reference is made to the new railway policy within the 1968 Transport Act, and the author explains the current policy by a discussion on three main themes: (1) the role of the railways in the transport system of Great Britain. (2) the role of government towards the nationalised industries (including British rail). (3) government support to the railways. It is suggested that, providing there is flexibility in planning and effective control over costs, the future prospects for British rail now look very encouraging. Significant technological

advances have been achieved, and it is considered that Great Britain is now fully committed to the maintenance of a national railway system with the acceptance, by the public, that this will involve substantial and continuing financial support.

Lazarus, PE *Rail International* No. 1, Jan. 1978, pp 1-9

ACKNOWLEDGMENT: TRRL (IRRD 232074)

ORDER FROM: ESL

DOTL JC

## 25 179527

### THE ROLE OF BRITISH RAIL IN PUBLIC TRANSPORT. THE GOVERNMENT'S RESPONSE TO THE FIRST REPORT FROM THE SELECT COMMITTEE ON NATIONALISED INDUSTRIES: SESSION 1976-77 HC305

This report is the response by the government to the first report from the select committee on nationalised industries (HC305) on the role of British rail in public transport. The first part of the response gives a summary of the government's view of the report as a whole. Part II is a commentary on the various groups of themes and recommendations which emerge from the report and includes comment on the following topics: demand for rail services, Forecasting demand, international comparisons, inter-urban passenger transport, freight and parcels, capital structures, pricing, coordination, manpower and productivity, investment. Part III deals with further recommendations. The British Railways Board's own observations are also included as an annex to the government's response to facilitate discussion of the report.

See also RRIS 25 163875; Bulletin 7801.

Institut de Mécanique des Fluides Paper NCMND 7038, Nov. 1977, 41 pp, 5 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 231339)

ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

26 169536

**LAND USE IN URBAN AREAS. VOLUME 2. SEPTEMBER, 1975-OCTOBER, 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)**

Research reports are cited on various aspects of urban land use including transportation planning, water resource management, air pollution, and land use zoning. (This updated bibliography contains 163 abstracts, 58 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0765 and NTIS/PS-75/656. See also Volume 1, 1964-Aug 75, NTIS/PS-76/0764.

Shonyo, CA

National Technical Information Service Nov. 1977, 168 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-77/0928/OST

26 173501

**TRANSPORT BIBLIOGRAPHY-CONTROL AND ORGANISATION OF TRANSPORT**

The bibliography contains references on the history and development of transport industry policy, management and organization. References are included on air, rail, road and marine transport modes.

Chartered Institute of Transport Monograph Dec. 1975, 35 pp

ACKNOWLEDGMENT: TRRL (IRRD 224398)

ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

26 174374

**SHIPPING AND TRANSPORTATION**

No Abstract.

Government Printing Office Aug. 1977, 9 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

26 174962

**DEMANDS AND NEEDS OF FUTURE TRANSPORTATION. PART 2. SURFACE TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)**

This bibliography is divided into four sections. Urban, Rail, Marine, and General studies. The urban transportation section contains 107 citations which cover such topics as passenger demand forecasting, future system requirements, needs for new types of transportation modes, planning to reduce future demand, and predictions of usage and feasibility of rapid transit railways, buses, taxicabs, and automobiles. The 36 abstracts of rail transportation studies cover freight forecasting, future passenger usage, and revenue predictions. The last two sections, marine and general, cite reports on the future of the U.S. shipping industry and general freight and passenger projections. (This updated bibliography contains 213 abstracts, 54 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0055 and NTIS/PS-76/0046.

Lehman, EJ

National Technical Information Service Feb. 1978, 223 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0066/7ST

26 175261

**URBAN MASS TRANSPORTATION ABSTRACTS. VOLUME NUMBER 4**

This volume is a reference document prepared by the Urban Mass Transportation Administration (UMTA) and serves as a guide to 313 reports generated under contract to UMTA. This document reflects UMTA's continuing commitment to the dissemination of technical report information to government, state, and local transportation planning bodies, private industry, and the general public. The types of documents abstracted in this volume are, by section: (I) Research, Development, and Demonstration Project Reports; (II) Technical Studies; and (III) University Research and Training Reports. Section (IV) contains complete indexes to the volume by report title, personal author, corporate author, geographic location, and keywords.

See also Volume 1, PB-213 212.

Urban Mass Transportation Administration UMTA-TRIC-77-1, Dec. 1977, 373 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-277290/3ST, DOTL NTIS

26 175635

**RAILROAD FREIGHT TRANSPORTATION. VOLUME 2. 1975-FEBRUARY, 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)**

The citations deal with freight car design, electronic engineering, economic impacts, intermodal systems, energy, scheduling, rolling stock utilization, rail revitalization, territorial distributions, cost analyses, computer applications, testing programs, and characteristics within specific regions. (This updated bibliography contains 152 abstracts, 50 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0197 and NTIS/PS-76/0169. See also Volume 1, 1964-1974, NTIS/PS-77/0196.

Young, ME

National Technical Information Service Bibliog. Mar. 1978, 157 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0182/2ST

26 176118

**BART AND METRO--RAPID TRANSIT FOR THE SAN FRANCISCO AND WASHINGTON, D.C. AREAS (A BIBLIOGRAPHY WITH ABSTRACTS)**

The two-section bibliography is devoted to the development of rapid rail mass transportation in two major metropolitan areas. The first section contains citations referring to BART, the San Francisco Bay area rapid transit system in California. Section two refers to the combined subway and surface transit system for the District of Columbia and outlying areas in Maryland and Virginia. Materials in both sections cover line siting, policies and planning, cars and power systems, stations and trackwork, human factors, travel patterns, and public attitudes. Attention is given to financing, revenue, maintenance, local impact, and environmental impact, as well as fare collection, noise, and legislation. Local and regional needs are discussed. (This updated bibliography contains 289 abstracts, 30 of which are new entries to the previous edition.)

Kenton, E

National Technical Information Service 1964, 299 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0392/7ST

26 176924

**JANE'S WORLD RAILWAYS AND RAPID TRANSIT SYSTEMS, 1977, NINETEENTH EDITION**

The book presents a worldwide survey of rail transport and gives detailed information in the following sections: manufacturers of locomotives and rolling stock; signalling and train control equipment, track maintenance equipment, and, diesel engines; tabulated details of international railways; reports on world railway systems by country; rapid transit, underground and surface railways. Indexes are included which list general manufacturers of railway equipment, and worldwide operators of railway systems.

Goldsack, P

Jane's Yearbooks Monograph No. 19, 1977, 580 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: TRRL (IRRD-231967)

ORDER FROM: Watts (Franklin), Incorporated, 730 Fifth Avenue, New York, New York, 10019

# Ongoing Research Summaries

## 00 Right-of-Way

00 048898

### MUCK UTILIZATION IN THE URBAN TRANSPORTATION TUNNELING PROCESS

The objective of this contract is to assess the problem of muck disposal as it emanates from the urban transportation tunneling process. An assessment was completed based on case histories of materials handling and muck utilization, possible uses of muck, interactions with subsurface investigations and muck properties. A draft handbook of guidelines was prepared and implemented in order to develop a muck utilization plan for the Mass Transit Administration (MTA) of Baltimore, Md. A final technical report has been printed, Number UMTA-MA-06-0025-77-15, December 1977; Available from NTIS-PB-278066. A Handbook of guidelines has been printed, Number UMTA-MA-06-0025-77-11, May 1977.

PERFORMING AGENCY: Haley and Aldrich, Incorporated

INVESTIGATOR: Liu, TK Tel (617) 492-6460

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-836 (CPFF)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: July 1977 TOTAL FUNDS: \$191,728

ACKNOWLEDGMENT: TRAIS (PR# TM-0013), TSC

00 058470

### ASSESSMENT OF DISRUPTIVE EFFECTS ASSOCIATED WITH URBAN TRANSPORTATION TUNNEL CONSTRUCTION

Effects of constructing both bored and cut and cover tunnels was considered. Effects from bored tunnels center on the impact of the construction of access shafts and cut and cover stations. The extent of the impact will depend on the spacing and the location of these relative to community services. Effects from cut and cover stations tend to follow a surface route within the urban area. Disruptive effects, therefore, may tend to be more concentrated in the former, but distributed in the latter. For each disruptive effect identified the currently used method(s) of measurement for determining that impact was identified. A preliminary approach to predicting and assessing the degree of each disruptive impact was developed. The study was expanded to collect real data and assess the completeness and validity of the approach developed by conducting a case study of tunnel construction on the MARTA system in Atlanta, Georgia.

Final Report: Phase A-No. UMTA-MA-06-0025-76-5, June 1976 is available from NTIS PB-256848 and Phase B-No. UMTA-MA-06-0025-77-14, July 1977 is Available from NTIS PB-271366.

PERFORMING AGENCY: ABT Associates, Incorporated

INVESTIGATOR: Wolff, PC Tel (617) 492-7100

SPONSORING AGENCY: Transportation Systems Center, UM-704

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1018

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: May 1975 TOTAL FUNDS: \$110,320

ACKNOWLEDGMENT: TRAIS

00 058758

### DESIGN METHODOLOGY FOR SOFT GROUND GROUTED TUNNELS

This research is for development and experiments to determine a rational basis for the design of grouted tunnels. Objectives are: 1. Perform field grouting trials using several different grouts, in varying soil conditions, to determine the degree to which the grout spreads, field strengths of the grouted soil, and aging effects of grouted soils. 2. Perform laboratory tests

of soils grouted in the field trials to identify the soils, establish stress strain properties and strength, and determine permeabilities. 3. Develop a finite element program to analyze movements and stresses around grouted tunnels. 4. Apply the finite element analysis to a field case history. STATUS: Laboratory testing, field testing, and analytical studies are involved in the work, and all of these phases are currently under way. Specific results to date include: 1) A fully developed finite element program capable of realistically modelling the problems of tunneling and excavation through or adjacent to chemically stabilized zones of soil. 2) Parametric studies using the finite element program showing the effects of growth zone size, and strength of surface subsidence above tunneling operations. 3) Development of a laboratory procedure for creating consistent samples of chemically stabilized soils. 4) 80 laboratory load tests on chemically stabilized soil samples illustrating the effects of confining pressure, soil water content, and rate of loading. 5) Publication of a report describing European and English stabilization techniques, costs and quality control procedures. 6) Field grouting trials involving injection of different types of grouts. Sampling and test of grouted zones is underway. 7) Development of on-site testing equipment, and the use of this equipment in monitoring grouting work for Washington, D.C.'s Metro System and Baltimore Metro System.

#### REFERENCES:

Observations of Chemical Stabilization Practice in England and Europe, Clough, GW, Report to DOT, July 1976

European Practice in the Use of Chemical Stabilization Systems for Soft Grout Tunneling, Clough, GW, Rapid Excavation & Tunneling Conf, Proc, Las Vegas, Nev., July 1976

PERFORMING AGENCY: Stanford University, Department of Civil Engineering

INVESTIGATOR: Clough, GW

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DOT-OS-50123

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1975 COMPLETION DATE: June 1978 TOTAL FUNDS: \$117,119

ACKNOWLEDGMENT: TRAIS, OST

00 059406

### TRANSIT INDUSTRY INPUT ON THE TUNNELING TECHNOLOGY PROGRAM

The American Public Transit Association will provide transit industry input, advice, and consensus on the Tunneling Technology Program. A review program will be established to review each of the UMTA/TSC R&D Contracts. Each panel will be comprised of experienced technical representatives of the transit industry. The areas include subway system maintenance, subway station design and construction, and tunnel standardization.

Although under separate contract to UMTA, U.S. DOT, this project relates to ongoing research performed by the National Academy of Sciences' U.S. National Committee on Tunneling Technology.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration, DC-06-0129

RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DOT-UT-60016T (CR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$49,054

ACKNOWLEDGMENT: TRAIS (DC-06-0129)

00 082313

**PRETHAWING PERMAFROST AND CONSOLIDATION IN PREPARATION FOR CONSTRUCTION**

The aim of this study is to develop efficient and economical methods of prethawing permafrost, and establish criteria for preconsolidation and stabilization of such soils to achieve range of bearing capacities applicable to roads, airfields, pipelines and foundations, including dams and bridges. Literature and data from related research will be reviewed and analyzed. Theoretical and laboratory studies will be conducted to optimize methods of pre-thawing, facilitate heat transfer, remove excess pore pressure and consolidate the soils. Field and laboratory studies will be conducted on stabilization, shear strength and bearing capacity of thawed soils, with and without surcharge loadings, and treatment with chemical and cement grouts.

PERFORMING AGENCY: Cold Regions Research and Engineering Laboratory, AT06-04-002

INVESTIGATOR: Crory, FE

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army, DA0J8151

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974 COMPLETION DATE: June 1978 TOTAL FUNDS: \$195,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZQA108151)

00 129709

**GUIDELINES FOR EXISTING SUBWAY MAINTENANCE**

The objective of this contract is to assess current subway system tunnel maintenance practices and problems and to perform an initial evaluation of new equipment, materials, and techniques that can be utilized on operational systems and to help eliminate, at the design state, those situations which have contributed to subway system deterioration and maintenance problems. Two sets of guidelines, one for subway system operators and one for designers, resulted: Rapid Transit Subways-Maintenance and Engineering Report, 7801, UMTA-MA-06-0025-78-1, NTIS PB-279691; Rapid Transit Subways-Guidelines for Engineering New Installations for Reduced Maintenance, 7801 UMTA-MA-06-0025-78-2, NTIS PB-279-453; Rapid Transit Subways-Maintenance Guidelines, 7801, UMTA-MA-06-0025-78-3, NTIS PB-279692.

PERFORMING AGENCY: Bechtel Corporation

INVESTIGATOR: Birkmyer, J Tel 415-768-1009

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617)494-2006

Contract DOT-TSC-1078

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: July 1975 TOTAL FUNDS: \$198,248

ACKNOWLEDGMENT: TSC

00 129710

**ECONOMIC FACTORS IN TUNNEL CONSTRUCTION**

This study developed a new cost estimating system for tunneling. The system may be used to aid planners, engineers, and designers in evaluating the cost impact of decisions they may make during the sequential stages of planning and design of urban transportation tunnels. In developing a cost estimating technique and method, an extensive review was made of currently available estimating systems. Techniques were adapted from the systems studies where applicable, and new methodologies were developed as needed for optimization. A detailed estimating technique is used in which units of effort are converted to obtain a base cost for a "standard" tunnel constructed in 1976 in Washington, DC. Correction factors may then be applied to obtain the costs in other time frames and geographic locations. The use of units of effort provides a technical base which does not change rapidly with time, but may be updated as changes in technology and productivity occur.

PERFORMING AGENCY: Underground Technology Development Corporation

INVESTIGATOR: Singstad, Kehart November and Hurka

INVESTIGATOR: Foster, E Tel (703) 360-3200 Toporoff, I

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DOT-TSC-1106

STATUS: Active NOTICE DATE: Dec. 1977 START DATE: Dec. 1975 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$130,000

ACKNOWLEDGMENT: TSC

00 130495

**BALLAST AND FOUNDATION MATERIALS RESEARCH PROGRAM**

This research study is concerned with development of a better methodology for considering ballast and foundation soils in the overall analysis and design of a railway support structure. A theoretical analysis model is being developed which is based on finite element theory and which will be able to more realistically consider the "stress-dependent" behavior of ballast and foundation materials. A number of different types of ballast and foundation materials will be subjected to various types of laboratory testing including repeated load triaxial testing. Laboratory test results and the theoretical analysis model will be used to identify material properties that are meaningful for evaluating potential material performance and to identify appropriate testing procedures for determining these properties. Ultimately, the research program will lead to development of rank ordering of ballast, subballast and foundation materials according to their potential in-service performance.

**REFERENCES:**

Material Evaluation Study FRA-ORD-77-02, Jan. 1977

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering

INVESTIGATOR: Thompson, MR Tel (217)333-3930 Ireland, HO Hay, WW

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312)567-3596

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (BG 885)

00 135095

**PHOTOELASTIC STUDY OF BLASTING PROCEDURES IN URBAN AREAS**

Dynamic photomechanics was employed to study the detailed mechanisms of the fracture process associated with rock blasting. The aim of the research was to understand the mechanism of rock breakage with explosives in order to improve blasting procedures for use in an urban environment. A significant effort was directed toward development of a method for producing controlled fracture planes in hard rock. Several different devices were produced which converted the random process of crack generation in blasting to a controlled process where fracture planes were directed along pre-specified lines. Of particular interest was the fracture control method utilizing notched boreholes and lightly-loaded, highly-cushioned explosive charges. This method should be useful in tunnelling where it can be employed to advantage in producing the opening cut and in producing the final contour of the walls and roof. The method should be less expensive than conventional smooth blasting procedures, should result in reduced ground vibrations in urban areas and should yield walls and roofs with more strength and stability due to a reduction in blasting induced cracks.

PERFORMING AGENCY: Maryland University, College Park, Department of Mechanical Engineering

INVESTIGATOR: Dally, JW Fournery, WL Holloway, DC Barker, DB

SPONSORING AGENCY: National Science Foundation, Division of Advanced Product Research and Technology, APR73-07908 A01

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Aug. 1973 COMPLETION DATE: June 1977 TOTAL FUNDS: \$311,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 639 1)

00 135249

**EVALUATION OF REMOTE SENSING APPLIED TO CIVIL WORKS PROJECTS**

The objective is to determine the feasibility of assessing civil works sites by measuring soil moisture using remote sensing in the 0.4 to 14 microns wavelength region. The approach was to perform investigations to determine the conditions under which soil moisture can be correlated with remotely sensed reflected energy (0.4 to 2.5 microns) and emitted energy (8 to 14 microns). Apply these results to civil works sites to evaluate their usefulness to field conditions. Applications to be studied include: landslides, levees, highways, ground water localities and dams. Application studies will be cooperative efforts with USACE and California State agencies.

PERFORMING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA  
 INVESTIGATOR: Chapman, DR  
 SPONSORING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA, 177-53-13 7570511

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZH 41637)

#### 00 135290

##### STRESS-STRAIN BEHAVIOR OF COHESIONLESS SOIL DURING UNLOADING AND RELOADING

The objectives of this research are: (1) To study the stress-strain characteristics of cohesionless soil during unloading and reloading using conventional triaxial tests, plane strain tests, triaxial tests with independent control of all three principal stresses on cubical specimens, and simple shear tests in which the principal axes of stress can be rotated. (2) To evaluate the procedures used for characterization of soil stress-strain behavior during unloading and reloading, and alternatively to develop improved procedures for this characterization.

PERFORMING AGENCY: California University, Los Angeles, Department of Mechanics and Structures  
 INVESTIGATOR: Lade, PV  
 SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG75-05325

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Oct. 1975 TOTAL FUNDS: \$27,600

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 5511)

#### 00 135514

##### RAPID ASSESSMENT OF ROCK MASS CONDITIONS

To develop a technique for the rapid assessment of the integrity of rock slopes, tunnel rock, dam abutments, and embankments. Thermal anomalies associated with known structural defects will be studied and their significance with respect to the behavior of the structure determined. Anomalies investigated will include loose tunnel rock, voids behind shotcrete and/or concrete structures, and leakage through dam abutments or embankments.

PERFORMING AGENCY: Waterways Experiment Station  
 INVESTIGATOR: Huie, JS  
 SPONSORING AGENCY: Waterways Experiment Station, DA0M8183  
 STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1974  
 ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZQA138183)

#### 00 135516

##### RAPID EXCAVATION WITH EXPLOSIVES-EXPLOSIVE EXCAVATION IN DIFFERING GEOLOGIC MEDIA AND TOPOGRAPHY

Purpose of study/investigation: To develop improved techniques of excavation with explosives for civil engineering projects that lead to cost stabilization or reduction. This program provides salary and travel funds for planning, executing and reporting field experiments at Corps project sites.

PERFORMING AGENCY: Waterways Experiment Station, Explosive Excavation Research Laboratory  
 INVESTIGATOR: Mills, RR  
 SPONSORING AGENCY: Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1973

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 356)

#### 00 135518

##### RAPID EXCAVATION WITH EXPLOSIVES; CHARGE SHAPE, EMPLACEMENT PATTERNS AND FIRING TECHNIQUES

Purpose of study/investigation: To develop controlled Project Lost Creek and the measurements made to get a large structural excavations where some cost advantage would result from the use of larger charges.

PERFORMING AGENCY: Waterways Experiment Station, Explosive Excavation Research Laboratory  
 INVESTIGATOR: Mills, RR  
 SPONSORING AGENCY: Army Corps of Engineers, Department of the

Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 358)

#### 00 135550

##### RATIONAL DESIGN OF TUNNEL SUPPORTS

The objective is to develop reliable design procedures & to encourage the adoption of improved construction techniques for tunnel support systems that satisfy structural and economic requirements. Various analytical solutions applicable to tunnels constructed by the Corps and other agencies will be documented and/or developed and checked for performance adequacy. The check will be accomplished by the review of instrumentation data from selected projects and follow-through construction and performance appraisal. Corrections will be made to the theoretical analysis for the purpose of arriving at reliable design approaches and construction procedures for tunnel support systems.

PERFORMING AGENCY: Department of the Army, Missouri River Engineering Division  
 INVESTIGATOR: Redlinger, JF Underwood, LB  
 SPONSORING AGENCY: Army Corps of Engineers, Department of the Army, 31214

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 529 2)

#### 00 136152

##### THE U.S. NATIONAL COMMITTEE ON TUNNELING TECHNOLOGY

The U.S. National Committee on Tunneling Technology was established in 1972, at the request of the Chairman of the Federal Council for Science and Technology, to assess the broad range of activities and related technologies pertaining to the use of subsurface space and to stimulate improvements in underground construction technology. Improvements are needed to meet increasing national demands for providing life-support functions in urban areas and activities of the International Tunneling Association (ITA) environmental impact. The committee's work for 1977 and 1978 is focused on subjects considered by the committee to be of highest priority with respect to improvement of the art of underground construction and tunneling, and improvement of conditions to accelerate the use of improved technology throughout the United States. These include both technical and nontechnical activities. The committee will continue its work in encouraging governmental agencies and industry to adopt practices in contracting for underground construction which are more appropriate for this type of work than those which have been traditionally used in this country and to improve the education of engineers, both in the university programs and in continuing education programs, with the long range goal being the general upgrading of planning, design, and construction of underground works. The committee will undertake tasks to review sectors of underground construction technology development and to recommend to government, to industry, and to the universities, actions which should be taken to upgrade both the state of the art in that sector and the application of the most advanced and appropriate technologies in the national interest. Sectors to be reviewed in the 1977-78 period include site investigation capabilities and applications and deep cavity and tunnel support systems. The Committee also participates in the activities of the International Tunneling Association (ITA) on behalf of the scientists, engineers, and technologists of the United States. The ITA was formed in 1974, and five cooperative projects are underway on the subjects planning use of the subsurface, research needs, and standardization, safety and contractual sharing of risk.

PERFORMING AGENCY: National Academy of Sciences; National Academy of Engineering

INVESTIGATOR: Bangert, RL Tel (202) 389-6831

SPONSORING AGENCY: Department of Energy

RESPONSIBLE INDIVIDUAL: Schmidt, WB Tel (202) 634-1249

Contract ET-77-C-01-9051

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1972 COMPLETION DATE: Dec. 1978

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 803 2)

**00 136165****U.S. NATIONAL COMMITTEE FOR ROCK MECHANICS**

The aims of the project are to review new developments and trends in rock mechanics; research, implement and enhance exchange of technical information among scientists; identify and encourage research activities that will advance rock mechanics technology; and participate for the United States in the International Society for Rock Mechanics and assist with international efforts to coordinate rock mechanics research. The Committee's activities include identification of research needs, preparation of advisory reports, coordination and participation in domestic and international professional conferences and symposia, and periodic reviews and surveys of national research efforts in rock mechanics and related fields. The Committee also participates in the activities of the International Society For Rock Mechanics (ISRM) on behalf of the scientists, engineers, and technologists of the United States. The ISRM, formed in 1962, sponsors international symposia and congresses and publishes the technical reports prepared by its study commissions, numbering 8 at present.

Also sponsored by 11 Federal agencies and 10 professional societies.

PERFORMING AGENCY: National Academy of Sciences; National Academy of Engineering

INVESTIGATOR: Bangert, RL Tel (202) 389-6415

SPONSORING AGENCY: Department of Energy

RESPONSIBLE INDIVIDUAL: Schmidt, WB Tel (202) 634-1249

Contract ET-77-C-01-9050

STATUS: Active NOTICE DATE: 7808 START DATE: Dec. 1967 COMPLETION DATE: Dec. 1978

**00 138477****EVALUATION OF REPAIR TECHNIQUES FOR DAMAGED STEEL BRIDGE MEMBERS**

The first phase of this project will identify and categorize common types of accidental damage to steel bridges and the frequencies of their occurrence; analyze the state of the art of present practice and equipment used for assessing damage and repairing highway and railroad bridges and other steel structures (including heating temperatures, jacking methods, straightening tolerance and degradation of steel's mechanical properties and service life); evaluate techniques that have been applied or may be applied for correcting structural damage; preparation of report of Phase I and outline Phase II research.

PERFORMING AGENCY: Battelle Columbus Laboratories, NCHRP 12-17

INVESTIGATOR: Mishler, HW Tel (614) 424-7378

SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Reilly, RJ Tel (202) 389-6741

Contract HR-12-17

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: National Cooperative Highway Research Program

**00 138532****TUNNELING**

To use underground space as an effective means of meeting the increasing needs of urban transportation systems, this program seeks to improve the social, economic and environmental impacts of tunneling processes, reduce costs of construction, improve tunnel design and maintenance procedures, and alter materials handling and utilization procedures. In the DOT Transportation Tunneling Program, UMTA is the lead administration in the following categories: Interactions with society, maintenance modal problems and materials handling.

PERFORMING AGENCY: Transportation Systems Center; Transit Development Corporation, Incorporated

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, GL

Contract UM-604

STATUS: Active NOTICE DATE: July 1976 START DATE: 1970 COMPLETION DATE: 1981 TOTAL FUNDS: \$30,000,000

ACKNOWLEDGMENT: UMTA

**00 139169****ENGINEERING AND GEOPHYSICAL STUDIES OF KANSAS TEST TRACK**

During the design, construction and operation of the Kansas Test Track, vibroseismic tests were performed to determine elastic properties of the subgrade. After the premature failure of KTT, an additional objective was to determine the failure mechanisms, appraise validity of built-in instrumentation's data and perform static and dynamic response investigations of unconventional track structures for validating analytical models of such construction. This includes nondestructive testing, other field testing and laboratory testing.

**REFERENCES:**

Vibroseismic Survey, Railway Test Embankment, Aikman, Kansas Curro, JR, Jr, WES Mis. Paper S-72-36

PERFORMING AGENCY: Waterways Experiment Station

INVESTIGATOR: Ballard, RF Tel (601) 636-3111

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Moody, HG Tel (202) 426-4377

Contract DOT-AR-30025

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Nov. 1972 COMPLETION DATE: Mar. 1978

ACKNOWLEDGMENT: FRA

**00 148333****FIELD RESEARCH EXPERIMENT FOR EVALUATION OF GEOLOGIC STRUCTURE AND ENGINEERING PROPERTIES OF GROUND USING NEW SITE EXPLORATION TECHNIQUES**

Boreholes available for new site exploration techniques such as: low-frequency Surface Profiling Radar; Borehole Radar; a Pulsed Acoustic System; and the use of advanced Data Processing Techniques.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority

INVESTIGATOR: Garrett, VK, Jr Tel (202) 637-1158

SPONSORING AGENCY: Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Linger, D Tel (202) 557-5272

Contract DOT-FH-11-9248

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: June 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$46,900

ACKNOWLEDGMENT: Washington Metropolitan Area Transit Authority

**00 153558****DEVELOPMENT OF COLORADO LAND USE DATA SYSTEM**

To develop technical criteria for identifying potential areas of natural hazard; e.g., floods, landslides, etc. Assess legal requirements of physical data for the designation of natural hazard areas. Develop the process of land use capability classification. Develop a technique for assessing the "environmental carrying capacity" as a land use planning tool. Assess the data system needs for a state land use data bank and develop appropriate software compatible with these needs.

**REFERENCES:**

The River Environment Simons, DB; Lagasse, PF; Chen, HH; Schumm, SA, Dept of Intl, Fish & Wildlife Serv, Twin Cities, Minn, Reference Document, Dec. 1975

Identification of Landslides and Mudflow Hazards Related to Land Utilization Development, Simons, DB, Reference Document, 1975

PERFORMING AGENCY: Colorado State University, Fort Collins, Department of Civil Engineering, CSRS COL

INVESTIGATOR: Simons, DB Wengert, NI Heil, R

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: July 1975 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068159)

**00 156203****THE MANAGEMENT OF MAJOR UNDERGROUND CONSTRUCTION PROJECTS**

The objective is to recommend measures which will enable those responsible for management of major underground construction projects to complete them on time and at a reasonable cost. All aspects of decision making

practices and program implementation control procedures at all involved agency levels are being reviewed and analyzed. The multidisciplinary committee is conducting interviews, employing questionnaires, and conducting workshops to develop and test recommendations.

This project also has received funding, under separate contracts, from the National Science Foundation and the Office of the Secretary, U.S. DOT. See also RRIS 059406.

PERFORMING AGENCY: National Academy of Sciences, National Committee on Tunneling Technology  
 INVESTIGATOR: Bangert, R.L. Tel (202) 389-6155  
 SPONSORING AGENCY: Urban Mass Transportation Administration; Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Butler, G.L. Transportation Systems Center  
 Tel (202) 426-0090 Chin, A. Tel (617) 494-2006 Hakala, W.W. Tel (202) 634-7183

Contract DOT-OS-70030

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$241,800

ACKNOWLEDGMENT: National Academy of Sciences-Natl Research Council

#### 00 170632

##### FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES

Size effects shown by earlier ORE studies (D 86) are to be checked by fatigue tests on I beams and box girders, incorporating butt welds as made in a workshop and as made at a construction site. Tests also on smaller beams appropriate to use in cranes and vehicles (co-ordination with B 12) are made. Final tests to be under load spectrum (co-ordination with D 128). Object is to show possible inadequacy of some design rules for structures subject to fatigue. At this time constant amplitude tests on I beams and on box beams have been completed. Tests using load spectrum are still in progress.

Six reports have been published to date. Question D130.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Thiele, W. Office for Research and Experiments  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973  
 ACKNOWLEDGMENT: UIC

#### 00 170633

##### STATISTICAL DISTRIBUTION OF AXLE LOADS AND STRESSES IN RAILWAY BRIDGES

Calculation of the dynamic response of bridges under high speed train running (mathematical models, field tests, parameter studies, irregularities), traffic load induced bridge component fatigue (load and moment spectra are determined from traffic and track loading; counting methods, fatigue calculation). Estimates of life under given traffic were made. Traffic spectra have been derived from typical trains. Load spectra have been calculated for given single beams by means of influence lines. A method for calculating the moment range spectrum has been worked out. In the process, traffic and bridge parameters have been treated separately. Stochastic studies of the movement of a random individual load and of continuous loading on the bridge beam have been made. Measurements on bridges have been obtained for comparison with the calculations.

Seven reports have been published to date. Question D128.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Thiele, W. Office for Research and Experiments  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1972  
 ACKNOWLEDGMENT: UIC

#### 00 170634

##### INVESTIGATION OF BRIDGE DECKS WITH CONCRETE ENCASED GIRDERS

Testing of six different laboratory models statically, to be followed by tests on similar models first loaded dynamically to produce realistic cracking before loading statically to failure. A 40 m double span bridge deck to be tested after dynamic pre-loading to failure under static load. After failure, anticipated at the central support, a simple span of 18 m taken from the remaining, undamaged portion is to be tested similarly. Object is possible revision of design rules. Tests are completed. Interim results confirm that design methods can be improved toward economy of material and final report is being prepared.

Nine reports have been published to date. Question D123.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Thiele, W. Office for Research and Experiments  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1971  
 ACKNOWLEDGMENT: UIC

#### 00 177845

##### UNDERGROUND LIFELINES IN A SEISMIC ENVIRONMENT

Lifelines supply and distribute essential services and functions to communities (energy, communications, transportation, water). The continued maintenance of these systems in seismic areas is not only vital to the health and safety of the communities they serve, but they also represent nearly one half of the total investment in structures. The safeguarding of these services is, therefore, clearly in the national interest. At the present time, there are no more than rudimentary provisions in a few building codes regulating the planning, design and construction of underground lifelines. The major reason for this is the almost complete absence of scientific and technical knowledge regarding the detailed behavior of these structures in seismic environments. The purpose of this project is to improve such knowledge and to apply it through risk and optimization studies to planning, design and construction of life line structures. The research will concentrate on underground water distribution lifelines. The specific tasks include: (1) a survey of such underground lifelines, (2) the development of appropriate seismic input, (3) methodology development for modeling and analysis, (4) methodology application to real systems, and (5) risk and decision analyses of lifeline systems. The results of the research will be presented in the form of design aids, guides and specifications, to be utilized by legislative and policy-making bodies, building code officials, utilities, planners, engineers, and the construction industry. This is a supplement to previous Award No. ENV 76-09838.

PERFORMING AGENCY: Weidlinger Associates  
 INVESTIGATOR: Baron, M.L.  
 SPONSORING AGENCY: National Science Foundation, Division of Advanced Environmental Research and Technology, ENV76-09838 A01

Contract

STATUS: Active NOTICE DATE: June 1978 START DATE: June 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$42,170

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 927 1)

#### 00 179326

##### DEVELOPMENT OF DESIGN RECOMMENDATIONS FOR CONCRETE TUNNEL LINERS

The objective of this procurement is to develop guidelines and recommendations for structural design of concrete linings of underground structures based upon ultimate strength concepts of concrete behaviour. This concrete may be in the form of either precast segments, cast-in-place, or shotcrete; and may be either reinforced or unreinforced.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering  
 INVESTIGATOR: Paul, S. Huer, R.  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Silva, L.P. Tel (617) 494-2351

Contract DOT-TSC-1504

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$349,000

ACKNOWLEDGMENT: TSC

#### 00 179327

##### RAILROAD BALLAST AND SUBGRADE REQUIREMENTS STUDY

No Abstract.

PERFORMING AGENCY: Goldberg, Zoino, Dunncliff and Associates  
 INVESTIGATOR: Simon, R. Tel (617) 244-4100  
 SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978

#### 00 179329

DEVELOPMENT OF AN EXTRUDED TUNNEL LINING SYSTEM  
 The objective of this R&D Program is to design, develop, fabricate, test and demonstrate an extruded liner tunneling system. Such a system would shorten the time requirement to excavate and time a tunnel section and



eliminate the need for primary support. The four phases of the 40 month program are: I. Laboratory Research and Development; II. System Engineering Design; III. System Development, and; IV. Field Test and Demonstration.

PERFORMING AGENCY: Foster-Miller Associates, Incorporated  
 INVESTIGATOR: Maser, K Tel (617) 890-3200  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1516

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$2,050,789

ACKNOWLEDGMENT: TSC

#### 00 179332

##### IMPROVED DESIGN PROCEDURES FOR UNDERGROUND SUPPORTS

The objective of this procurement is the development of an analysis design approach which uses the principle of optimization, can rationally handle ground-structure behavior and allows incorporation of improved knowledge on ground structure behavior whenever this becomes available.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Einstein, HH Tel (617) 253-3598  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Silva, LP Tel (617) 494-2351

Contract DOT-TSC-1489

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$97,000

ACKNOWLEDGMENT: TSC

#### 00 179343

##### MANAGEMENT OF MAJOR UNDERGROUND CONSTRUCTION PROJECTS-- PLANNING, DESIGN, CONSTRUCTION

Major federal and local investments are now being made in underground construction for transportation, water supply, and wastewater disposal. Risks and costs of underground construction can be substantially reduced by improved management at all stages of a project-conceptual, predesign planning, design, construction and start-up. A detailed study will be conducted to identify in construction projects the practices and procedures which contribute to unnecessary escalation of costs and to recommend improved procedures. The study will include a detailed analysis of a hypothetical, urban, underground construction project. Elements will be examined to determine what changes should be made to reduce negative impacts. The study will concentrate on the steps involved in the management process, their essentiality and interdependence, and how they can be

improved. Results will be published and distributed in the form of reports including recommended improved procedures.

See also RRIS 00A 156203.

PERFORMING AGENCY: National Academy of Sciences

INVESTIGATOR: Bangert, RL

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR76-21355 C310 T.O. 351

Contract

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1978 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$35,336

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1756 1)

#### 00 179344

##### IMPROVED DESIGN PROCEDURES FOR UNDERGROUND STRUCTURAL SUPPORT SYSTEMS IN ROCK

The research objective is to obtain improved analysis and design procedures for structural support systems of underground openings in rock. Present design procedures are based on assumed loads and do not adequately consider the influence of the construction procedure and rock-support interaction. Support systems for large vaults (such as used for underground powerhouses and subway stations) and for intersections of vaults and tunnels have been identified as areas where significant economies in construction can be realized with improved analysis and design procedures. The initial effort includes a review of analysis and design procedures used for selected projects, e.g., the Washington Metro subway system. Measured rock deformations and support strains at sections of the selected projects will also be reviewed. The observed behavior of the rock and support systems of representative underground vault or major tunnel during construction will be correlated with the response of a three-dimensional nonlinear finite element model of this installation during the same simulated sequences of construction. A second analytical study will consider a typical intersection of two underground vaults or major tunnels. After verification of the analysis procedure, the analysis of the intersection will be repeated using a more economical support arrangement than conventionally provided. Cases then will be analyzed to provide sets of parametric curves that can be used for preliminary design of selected support systems.

PERFORMING AGENCY: Agabian Associates

INVESTIGATOR: Raney, EM

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR76-80044

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$179,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 39)

01 038973

**RAILROAD TRACK STRUCTURES RESEARCH**

The Federal Railroad Administration (FRA) and the Association of American Railroads (AAR), the contractor, enter into a program to perform specific Railroad Track Structures Research. The program is expected to encompass a number of tasks for research into a variety of technical factors affecting railroad track and related systems and subsystems. The Railroad Track Structures Research Program consists of Four Tasks: Mathematical Modeling, Ballast and Subgrade Material Performance Tests, Rolling Load Facility Tests and Track Research Laboratory Facility. Work continues only on Ballast and Subgrade Material Performance Tests and on the Rolling Load Facility Tests.

**REFERENCES:**

- Technical Data Base Report (Task 2) July 1975, PB-251771
- Functional Requirements for a Facility for Accelerated Service testing (task 4), Sept. 1976, PB-263605
- Structural Model and Materials Evaluation Procedures (task 2), Sept. 1976, PB-262987
- Track Support Systems Parameter Study (Task 2) Sept. 1976, PB-263370
- Finite Element Analysis of a Railway Track Support System - User's Manual (task 2), Sept. 1976, PB-262988
- Material Evaluation Study (Task 2) Jan. 1977, PB-264215
- Lateral Stability of Ballast (Task 2) Sept. 1977, PB-275035
- A Study of Railroad Ballast Economics (Task 2) Sept. 1977, PB-275102

**PERFORMING AGENCY:** Association of American Railroads; Illinois University, Urbana, Department of Civil Engineering

**INVESTIGATOR:** Lundgren, JR Tel (312) 567-3588 Thompson, MR Tel (217) 333-3930

**SPONSORING AGENCY:** Federal Railroad Administration

**RESPONSIBLE INDIVIDUAL:** Moody, HG Tel (202) 426-4377 Putukian, J Tel (617) 494-2206

Contract DOT-FR-30038 (CR)

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** May 1973 **COMPLETION DATE:** June 1979 **TOTAL FUNDS:** \$673,029

**ACKNOWLEDGMENT:** FRA

01 038974

**CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK. PHASE 3**

The contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.

**REFERENCES:**

- A Review of Measurement Techniques, Requirements and Available Data on the Dynamic Compliance of Railroad Track, Kaiser, WD, May 1975, PB-250547/AS

**PERFORMING AGENCY:** Battelle Memorial Institute

**INVESTIGATOR:** Prause, RH Tel (614) 299-3151

**SPONSORING AGENCY:** Federal Railroad Administration

**RESPONSIBLE INDIVIDUAL:** O'Sullivan, WB

Contract DOT-FR-30051 (CPFF)

**STATUS:** Active **NOTICE DATE:** Aug. 1977 **START DATE:** May 1973 **COMPLETION DATE:** 1979 **TOTAL FUNDS:** \$332,110

**ACKNOWLEDGMENT:** TRAIS (PR # RP-39)

01 058458

**FABRICATE, TEST, EVALUATE, AND DELIVER AN ULTRASONIC WHEEL PROBE INSPECTION SYSTEM**

Objectives are: 1. To provide ultrasonic wheel probes for an ultrasonic inspection system which can detect all potentially dangerous defects. Particular emphasis shall be given to the detection of vertical split heads and the inspection of welded joints in continuously welded rail. The capabilities of these components will improve the detectability of ultrasonic inspection and also provide additional defect information needed to facilitate automatic data processing. 2. To test and evaluate the ultrasonic system in the field by comparing the inspection results with that of a magnetic inspection system.

**PERFORMING AGENCY:** DAPCO Industries, Incorporated

**INVESTIGATOR:**

**SPONSORING AGENCY:** Transportation Systems Center, RR-519

**RESPONSIBLE INDIVIDUAL:** Ceccon, H Tel (617) 494-2000

Contract DOT-TSC-995

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** Apr. 1975 **TOTAL FUNDS:** \$75,552

**ACKNOWLEDGMENT:** TRAIS (RR-519)

01 058644

**RAIL FLAW OCCURRENCE SURVEY**

Objectives are: 1. Develop the data base from a review of available failure records from which statistical evaluations can be made. 2. Develop and apply statistical procedures which will determine interrelationships of rail failure and train derailment occurrence. 3. Calculate severity indices for difference types of rail defects as causes of train derailments from this analysis of the data base. 4. Ascertain, for defects of important severity, the relationships between flaw occurrence, load environment and characteristics of track locations, construction, maintenance, and inspection. 5. Propose one or more approaches for the reliability analysis of rail-in-service utilizing the information generated.

**PERFORMING AGENCY:** Midwest Research Institute

**SPONSORING AGENCY:** Transportation Systems Center, RR-519

**RESPONSIBLE INDIVIDUAL:** Bush, M Tel (617) 494-2310

Contract DOT-TSC-1061 (CPFF)

**STATUS:** Inactive **NOTICE DATE:** Aug. 1978 **START DATE:** June 1975 **TOTAL FUNDS:** \$64,195

**ACKNOWLEDGMENT:** TRAIS (RR-519), FRA

01 058673

**SLEEVE EXPANSION OF BOLT HOLES IN RAILROAD RAIL**

Objectives are: 1. To ascertain by laboratory testing that the sleeve expansion process is likely to be an effective means of reducing the bolt hole failure rate under railroad loading conditions. 2. Having accomplished this, to devise and implement a test plan for a preliminary field evaluation defining costs and time required to implement the plan.

**PERFORMING AGENCY:** Boeing Company

**SPONSORING AGENCY:** Federal Railroad Administration, Office of Research and Development, RR-519

**RESPONSIBLE INDIVIDUAL:** Steele, RK Tel (617) 494-2457

Contract DOT-TSC-1048

**STATUS:** Completed **NOTICE DATE:** Sept. 1978 **START DATE:** June 1975 **TOTAL FUNDS:** \$238,681

**ACKNOWLEDGMENT:** TRAIS (RR-519), FRA

01 058698

**INSTRUMENTATION AND DATA PROCESSING EQUIPMENT ON RAIL VEHICLES FOR MEASURING TRACK GEOMETRY AND RAIL FLAW DETECTION**

Tasks include: 1. Refurbish a rail hospital car for track inspection applications. 2. Install a vehicle track geometry measurement system and install rail flaw detection instrumentation. 3. Furnish and install an on-board digital computer system for system control, data recording and data processing. 4. Develop and implement the necessary computer programs for performing on-board track geometry defect analysis and rail flaw analysis. 5. Survey the market for availability of a high railer-type motor vehicle and track geometry instrumentation for the purpose of providing unloaded measurements. 6. Carry out validation and acceptance testing of the completed track inspection vehicle. 7. Conduct a training program for operation and maintenance personnel.

**PERFORMING AGENCY:** ENSCO, Incorporated

**SPONSORING AGENCY:** Federal Railroad Administration

**RESPONSIBLE INDIVIDUAL:** Mould, JC Tel (202)426-1682

Contract DOT-FR-54190 (CPFF)

**STATUS:** Completed **NOTICE DATE:** Aug. 1978 **START DATE:** June 1975 **TOTAL FUNDS:** \$2,900,000

**ACKNOWLEDGMENT:** TRAIS

01 058728

**ANALYSIS AND DESIGN REQUIREMENTS FOR IMPROVED CROSS TIE TRACK SYSTEMS**

The emphasis is on applying existing data, analyses, and instrumentation to a characterization of the response and deterioration of track structures under typical wheel/rail loads. In addition, studies of the influence of tie/fastener characteristics on track performance and the adequacy of 'synthetic' tie

fastener assemblies for mainline application under typical North American loadings will be coupled with an economic study to investigate the feasibility of 'synthetic' cross ties for U.S. usage. Additionally, FAST data on concrete vs wood tie track performance will be analysed to conduct a relative performance assessment.

PERFORMING AGENCY: Battelle Memorial Institute  
SPONSORING AGENCY: Transportation Systems Center, RR-519  
RESPONSIBLE INDIVIDUAL: Kish, A Tel (617) 494-2649

Contract DOT-TSC-1044

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$575,884

ACKNOWLEDGMENT: TRAIS (RR-519), FRA

#### 01 059223

##### STATISTICAL REPRESENTATIONS OF TRACK GEOMETRY

The objective is to conduct analyses of existing track geometry data in order to provide power spectral density and/or other statistical characterizations of the universe of track geometry conditions and to identify fundamental processes.

PERFORMING AGENCY: ENSCO, Incorporated  
SPONSORING AGENCY: Transportation Systems Center, R6321  
RESPONSIBLE INDIVIDUAL: Weinstock, H Tel (617)494-2000

Contract DOT-TSC-1211 (CPF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$87,792

ACKNOWLEDGMENT: TRAIS (R6321)

#### 01 059227

##### USE OF SURFACE ELECTROMAGNETIC WAVES TO DETECT RAIL JOINT FAULTS

The objective of this study is to determine experimentally the characteristics of surface electromagnetic waves (SEW)--transmission, reflection and radiation due to various defective and nondefective rail joints. These experiments are designed to verify the theoretical results for an ideal rail joint and to measure the effects of various perturbations of the rail joint. Also suitable techniques for coupling surface electromagnetic waves to the rail will be investigated. One outcome of this study will be a realistic evaluation of the applicability of the SEW technique to the detection of rail joint faults from a track-guided vehicle.

PERFORMING AGENCY: Missouri University, Rolla  
SPONSORING AGENCY: Transportation Systems Center, R6357  
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617)494-2000

Contract DOT-TSC-1217 (CR)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976 COMPLETION DATE: July 1977 TOTAL FUNDS: \$56,690

ACKNOWLEDGMENT: TRAIS (R6357)

#### 01 059295

##### TRACK GEOMETRY MEASUREMENT BY HIGH RAIL VEHICLE

The need for increased track surveillance capability and data collection capability for transportation planning and rail assistance programming has led Iowa's Department of Transportation to purchase a high rail track geometry measuring vehicle. The objective is to examine the capabilities of this vehicle to assist in the improvement of track safety inspection and in data collection for transportation planning and assistance programming. The project will examine both technical and operational aspects of Track Geometry Car usage as an inspection device and as a data collection device.

PERFORMING AGENCY: Iowa Department of Transportation  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Liang, RT

Contract DOT-FR-64243 (CR)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$273,415

ACKNOWLEDGMENT: TRAIS

#### 01 059371

##### IMPROVEMENT OF MAGNETIC TECHNIQUES FOR RAIL INSPECTION

The objective is to improve the magnetic inspection techniques through improvement of the sensing and signal processing methods. The opinion in

the railroad industry is that although the ultrasonic systems appear to have the greater potential, it requires further development before it can perform a thorough and complete inspection. Until these techniques are upgraded and proven in the field, magnetic inspection methods offer a good supplementary inspection. The intent is to improve magnetic inspection techniques and equipment so that the performance is improved when operated as an independent system or when providing supplementary support to ultrasonic systems.

PERFORMING AGENCY: Battelle Memorial Institute  
SPONSORING AGENCY: Transportation Systems Center, R6345  
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617)494-2000

Contract DOT-TSC-1244 (CPF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1976 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: \$97,994

ACKNOWLEDGMENT: TRAIS (R6345)

#### 01 059681

##### TEST AND EVALUATION OF THE TRACK GEOMETRY MEASUREMENT SYSTEM (TGMS)

The objectives are to: (1) Demonstrate the TGMS on the selected transit property. (2) Evaluate the TGMS under real world operating conditions on the selected transit property. (3) Collect track geometry data on the selected property. (4) Develop a Ways and Structures Maintenance Plan utilizing the TGMS. (5) Determine minimum requirements for real-time output from the TGMS to support Ways and Structures inspection under the Maintenance Plan, and identify the minimum component parts and operating characteristics of TSCs TGMS needed to achieve the minimum real-time output requirements.

PERFORMING AGENCY: Systems Technology Associates, Incorporated  
SPONSORING AGENCY: Transportation Systems Center, R6732  
RESPONSIBLE INDIVIDUAL: Nickles, JE Tel (617) 494-2302

Contract DOT-TSC-1285 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: May 1978 TOTAL FUNDS: \$305,215

ACKNOWLEDGMENT: TRAIS (R6732)

#### 01 081797

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 1--TRACK STRUCTURES

Task objectives are development of recommended performance specifications and maintenance and geometric design guidelines for conventional railroad track and related track structures and components. This activity is intended to quantify the adequacy of a guideway that yields an acceptable level of ride quality and safety with minimization of first cost, maintenance costs, and secondary costs such as loss and damage, and wear and fatigue to vehicles. Task will recognize that load environment is a function of track parameters, wheel load, and level of maintenance. The Track Structures Dynamic Test Facility, developed under separate AAR/FRA contract, has the capability of determining the basic structures as affected by different subgrade materials, different types of ballast, various types of ties, spacing and rail sizes. A moving load allows for compaction of ballast subgrade material. Also sensitivity studies of track parameters, including basic alignment of the structure with such factors as minimum length of tangent between curves and deviation from theoretical line and surface, have been made using computer modeling techniques developed in Phase I.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Abbott, RA Tel (312) 567-3616

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

#### 01 099369

##### OPERATION OF TEST TRACK AND RAIL INSPECTION EQUIPMENT

Because of the interdependence between each of the newly developed components for track and rail inspection, a critical test and evaluation must

be carried out on each to assess its contribution to the total system. From the results of the tests and evaluations, an assessment of the developments can provide the information needed to generate work statements for future developments. In order to facilitate an effective test and evaluation, qualified technical personnel and testing facilities are required. The facilities primarily consist of an NDT laboratory, two test tracks, and a rail inspection vehicle. The NDT laboratory contains the instrumentation needed to perform the commonly used NDT techniques. The test tracks contain machined and natural rail defects on which inspection equipment can be tested up to speeds of 40 mph. The rail inspection vehicle is a hi-rail vehicle and currently uses ultrasonics exclusively to perform the rail inspection. The hi-rail vehicle provides the mobility required for a test vehicle and has ample space to house newly developed equipment. The staff presently consists of two technicians and two engineers.

PERFORMING AGENCY: Transportation Systems Center  
SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research  
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617) 494-2000

In-House

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Mar. 1974

ACKNOWLEDGMENT: FRA

#### 01 099378

##### IMPROVED INSPECTION, DETECTION AND TESTING RESEARCH

The objectives of this program are to provide engineering and field test support services to FRA-sponsored programs and to develop additional track inspection vehicles for the Office of Safety. In the process of collecting data for Amtrak, the Northeast Corridor Project and the Office of Safety, as well as for other FRA R&D programs, 260 tests on some 25 different railroads covered approximately 100,000 miles of track. The track geometry measurement system previously developed can now be utilized to detect safety-related defects. To provide the Office of Safety with three track inspection systems, an existing vehicle is being rebuilt and a new unit is being built.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research  
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
RESPONSIBLE INDIVIDUAL: Peterson, LA Tel 202-426-2965

STATUS: Active NOTICE DATE: Feb. 1978 TOTAL FUNDS: \$6,245,000

ACKNOWLEDGMENT: FRA

#### 01 099393

##### PROGRAM FOR INVESTIGATION OF RAIL FAILURES

The objective of this program is to evaluate the metallurgical and applied stress environment coincident with failures in conventional carbon steel rail and in other types. The following steps are involved: (A) Characterize in the laboratory, service-developed defects resulting in field failures in carbon steel rails with emphasis on short service life or premature failures; (B) Determine in the laboratory the chemistry, metallography and mechanical properties of carbon steel rails in service; (C) Determine in the field the state of stress in carbon steel rails in service under a wide range of conditions track and loadings; (D) Establish possible interrelationships of material properties, service stresses and service failures; (E) Promote similar laboratory and service evaluations of economically attainable variations in rail steel and treatments, consistent with progress of work performed on carbon steel rail. Specimens supplied consist of 8-foot rail sections containing a detected defect. These specimens are used to determine the spectrum of properties which possibly may be associated with each type of defect. Selected in-track sites are instrumented to determine service stresses associated with fatigue crack initiation. Relation between service-initiated failures and attendant stress is correlated. Work with steels other than the conventional carbon type is to be undertaken.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; American Iron and Steel Institute; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

#### 01 099394

##### RAIL FLAW DETECTION SYSTEMS

The detector car section of the AAR Technical Center has constantly worked on materials and systems for upgrading the privately-owned and operated rail detector cars using the residual magnetic method as developed and built by the AAR. Along with this, studies of advanced technologies of rail flaw detection, such as ultrasonics, have been conducted. An ultrasonic rail test system and recording equipment to meet FRA track inspection requirements was initially tested under one of the standard magnetic detector cars. The ultrasonic system significantly increased flaw detection due to its greater sensitivity in the web area. This was followed by construction of a new detector car equipped exclusively with ultrasonics which will be used in refining techniques using this rail flaw detection system.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

#### 01 099396

##### ACOUSTICAL EMISSION MONITORING OF FIELD AND PLANT WELDS

Acoustical emissions in the ultrasonic range can be monitored with appropriate equipment to determine the soundness of field and plant welds made in steel rails. The investigation has shown that good and bad welds can be detected by the procedure. Additional development is directed to the refinements necessary for a production installation.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

#### 01 138467

##### MECHANICS OF BALLAST COMPACTION

Formulation of ballast compaction guidelines based on a review of the theory on the compaction of ballast sized, non-cohesive materials, laboratory and field measurements. Measures of the degree of ballast compaction are being developed. Field tests being run at FAST track in Pueblo, Colorado.

PERFORMING AGENCY: State University of New York, Buffalo

INVESTIGATOR: Selig, ET Tel (716) 831-3113

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Sluz, A Tel (617) 494-2432

Contract DOT-TSC-1115

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Jan. 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$350,000

ACKNOWLEDGMENT: TSC

#### 01 138535

##### TRACK GEOMETRY MEASUREMENT

This project is to produce a real-time track geometry measurement system which includes on-line data processing capability and may be used at revenue speeds without requirement for a special vehicle.

PERFORMING AGENCY: Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract UM-504

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Jan. 1974 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$1,600,000

ACKNOWLEDGMENT: UMTA

#### 01 138560

##### TRACK INSPECTION AND TESTING

Develops, recommends, implements and promotes an improved inspection and detection project in support of the FRA National Track Inspection Program. Provides for support of test activities and data collection and

coordinates support with the Office of Safety, other FRA elements, government agencies, railroads and support contractors. Makes provisions for instrumentation, operation, maintenance and transportation of automated inspection equipment and for data processing services.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 01 138561

##### AUTOMATED TRACK INSPECTION, SYSTEM DEVELOPMENT

The objective of this program is to provide automated equipment to assist the FRA Track Inspectors in monitoring the National track network. A fleet of vehicles will be procured to measure track geometry and internal rail flaws. This fleet includes three existing measurement vehicles which provide real time data to both the inspector and the host railroad. Other measurement systems will be developed and tested for potential use in inspection vehicle.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 01 138562

##### IMPROVED TRACK STRUCTURES RESEARCH PROGRAM

The Improved Track Structures Research Program has been established to achieve improvements in the safety of train operations by reducing the frequency of train derailments through the use of guidelines, standards and techniques for achieving safer track structures and to improve the serviceability of the track structures through more effective maintenance techniques and with more durable, yet economic track structure designs. The program will accomplish these objectives through a series of contract research efforts and research at the Transportation Systems Center addressing both analytical studies and field test verification.

For subprograms see RRIS Nos. 01A 138563 and 01A 138564.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 01 138563

##### TRACK ACCIDENT REDUCTION RESEARCH SUBPROGRAM

The Track Accident Reduction Research Subprogram is directed toward improvement in the number and frequency of train accidents related to track structure causes by identification of operating limits for existing rolling stock running on contemporary track based on limiting adverse wheel/rail dynamic interaction and by specification of the safe structural load bearing limits of existing track systems and required inspection demands.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 01 138564

##### IMPROVED TRACK PERFORMANCE RESEARCH SUBPROGRAM

The Improved Track Performance Research Subprogram is directed toward improvement in track stability and life by development of cost effective guidelines for upgrading current track systems, for designing affordable track system alternatives and for making cost effective maintenance decisions. The following technical areas are being considered: new rail quality, improved rail joining techniques, analysis and design for improved

cross tie-track systems, ballast selection-material performance studies, soil stabilization studies, ballast tamping and consolidating equipment performance maximization and track maintenance studies.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 01 138568

##### COOPERATIVE RESEARCH PROGRAM ON TIMBER CROSS TIE DEVELOPMENT

A variety of particle board specimens involving variations in geometry, orientation and binding resins for the fibers have been investigated for the production of a reconstituted cross tie. The design with seven laminated particle boards with the external laminates featuring fiber orientation have been subjected to laboratory tests showing them having characteristics much like sawn hardwood ties. Production of several hundred ties for service testing and economic analysis of the feasibility of such a product are being made.

PERFORMING AGENCY: Forest Products Laboratory; Association of American Railroads Technical Center

SPONSORING AGENCY: Forest Products Laboratory; Association of American Railroads; Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: 1973

#### 01 139163

##### ENGINEERING ANALYSIS OF STRESS IN RAILS

This program is to develop & apply procedures for predicting stresses in rails; to provide a description of stresses required for prediction of rail degradation and rail failure due to fissures, split heads and bolt hole cracks; to assess design and operational trade-offs on thermal, flexural, residual and contact stresses and to provide input to a rail reliability model. The goal is an analytical model where factors in rail degradation may be determined.

##### REFERENCES:

Preliminary Description of Stresses in Rails Johns, TG; Davies, KB, Report FRA-ORD-76-294

PERFORMING AGENCY: Battelle Columbus Laboratories

INVESTIGATOR: Johns, TG Tel (614)424-4569

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Transportation Systems Center, Office of Ground Systems

RESPONSIBLE INDIVIDUAL: McConnell, DP Tel (617) 494-2649

Contract DOT-TSC-1038

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$429,000

ACKNOWLEDGMENT: FRA

#### 01 139165

##### COLLECTION AND ANALYSIS OF TEST DATA

Because of the premature failure of the Kansas Test Track, the contractor is to complete analysis of available data and to conduct a post mortem study of the instrumentation originally installed in concrete cross tie/and concrete slab track. Premature termination of traffic meant that all of the data sought will not be obtained. Remaining instruments are to be examined for condition and environment with the aim of determining if the data that was obtained was valid. Reports describing track performance using the available data will be completed.

##### REFERENCES:

Kansas Test Track Instrumentation Internal Report Internal Letter Report, July 1976

PERFORMING AGENCY: Portland Cement Association

INVESTIGATOR: Colley, BE Tel (312)966-6200 Hanson, NW

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Moody, HG Tel (202)426-4377

Contract DOT-TSC-FR-90043

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1971 COMPLETION DATE: Mar. 1978

ACKNOWLEDGMENT: FRA

01 139167

**MEASUREMENT OF VERTICAL TRACK STIFFNESS**

The objective is to demonstrate the feasibility of stiffness measurement using the Kansas Test Track and the FRA track measurement cars equipped with existing track surface measurement systems and then develop and demonstrate software to support real-time measurement of stiffness using Southern Railway's Track Measurement Car R-1. Soft spots may be determined before they develop into serious geometric defects and it can be found if an existing geometric defect is related to track stiffness.

PERFORMING AGENCY: ENSCO, Incorporated

INVESTIGATOR: Corbin, JC Tel (703) 321-9000

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: O'Sullivan, WB Tel (202) 426-4377

Contract DOT-FR-54174

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Aug. 1975 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: FRA

01 148355

**ROAD MAINTENANCE COST MODEL**

The road maintenance cost model project is directed towards the construction of a large computer model which will simulate the processes by which rail, ties and ballast in a length of track deteriorate under a selected traffic of varied composition to levels which necessitate their periodic replacement. The model is designed to estimate the impact of given traffic mixes on track component replacement cycles in a specified type of track through the employment of a series of theoretical/empirical wear models. Incremental costs are to be determined by a routine that deletes each segment of the traffic mix in turn, converting the estimated service life differential to an appropriate annual charge which reflects the simulated "consumption" of the track asset. Progress to date has seen the construction of a rail wear/cost model which is currently being adapted for operational use.

## REFERENCES:

Road Maintenance Cost Model Roney, MD; Lake, RW, Canadian Institute of Guided Ground Transport, Interim Report, Mar. 1977

Road Maintenance Cost Model Phase I-Rail Wear Modelling Roney, MD; Turcot, MC; Lake, RW; Schwier, C, Canadian Institute of Guided Ground Transport, May 1978

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.52.76

INVESTIGATOR: Roney, MD Tel (613) 547-5777 Turcot, MC Lake, RW

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific

RESPONSIBLE INDIVIDUAL: Hanks, WG Tel (514) 877-5771 Tufts, LD Tel (514) 861-6811

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1976 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$117,780

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

01 160047

**DEVELOPMENT OF DATA PROCESSING FOR RAIL FLAW DETECTION. PHASE I**

No Abstract

Phase II to begin in June 1978.

PERFORMING AGENCY: Sperry Univac Computer Systems

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Mould, JC RRD-31 Tel (202) 426-1682

Contract DOT-FR-74297 (CPFF)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Mar. 1977 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: \$121,867

ACKNOWLEDGMENT: TRAIS

01 170600

**THE ELECTROSLAG WELDING OF ALLOY RAIL STEELS**

In the first year of research, it is hoped to establish preparation, set-up and operating conditions that are necessary to produce sound electrosag welds in both standard carbon and 1% chromium rail steels. Particular emphasis will be placed on the quality of the bottom of the weld and on the influence of preheat and postheat treatment on the microstructure of the rail steel adjacent to the weld, correlating any structural changes to possible changes

in mechanical properties. The longer term objectives include optimization of the metallurgy of the weldment, reduction in the time required to complete a weld, and the introduction of further degrees of process automation. Ultimately, conversion to the fully-automated mode appears to hold the key to development of a cost-effective method of producing high-quality rail welds in track without the high degree of operator-induced variance characteristic of the thermit welding method.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 2.75.77

INVESTIGATOR: Cameron, J Tel (613) 547-5908 Mackay, WBF

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Rennie, RP Tel (514) 877-4337 Tufts, LD Tel (514) 861-6811 McLaren, W Tel (514) 283-4536

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$138,000

ACKNOWLEDGMENT: CIGGT

01 170607

**STANDARD SPECIFICATIONS FOR RAPID TRANSIT CONCRETE TIES-TEST AND EVALUATION**

Preliminary specifications have previously been developed for the use of concrete ties for rapid transit. The purpose of this contract is to manufacture both monoblock and duoblock ties in accordance with these specifications and to laboratory test them following established test procedures. Based on the results of these tests, modified preliminary specifications will be developed.

PERFORMING AGENCY: Portland Cement Association, Construction Technology Laboratories

INVESTIGATOR: Hanna, A Tel (312) 966-6200

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Witkiewick, P Tel (617) 494-2006

Contract DOT-TSC-1442

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$98,917

ACKNOWLEDGMENT: TSC

01 170616

**TRACK STRENGTH CHARACTERIZATION PROGRAM**

The purpose of the track strength characterization program is to develop a technique for the determination of the ability of track to withstand anticipated service loads and to utilize this technique for the development of recommended track strength requirements and/or wheel force restrictions for the different categories of track. This program will feature the ability to examine and classify existing tracks with non-destructive methods and with a minimum occupation of the track.

## REFERENCES:

Preliminary Outline Track Strength Characterization Program, Zarembski, AM, Sept. 1977

PERFORMING AGENCY: Association of American Railroads Technical Center, K103

INVESTIGATOR: Zarembski, AM Tel (312) 567-3622

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

01 170618

**A THEORY FOR TRACK MAINTENANCE LIFE PREDICTION**

Over a period of time, railroad track will settle as a result of permanent deformation in the ballast and underlying soil layers produced by traffic loading. After some period of time, maintenance will be needed to resurface and line the track. Suitable methods do not presently exist for predicting the maintenance life, which is a function of many factors. This study shall develop a theory for prediction of track settlement which is applicable to estimating maintenance life for new or existing track. The research approach, focusing on the inelastic behavior of soil, involves: (1) establishing required characteristics for the track system components, (2) setting up a computer model, (3) studying the behavior of ballast and soil under representative cyclic loading, and (4) validating the model using available field experience, including data from FAST in Pueblo, Colorado.

PERFORMING AGENCY: State University of New York, Buffalo, Department of Civil Engineering  
 INVESTIGATOR: Selig, ET Tel (716) 831-3113  
 SPONSORING AGENCY: Department of Transportation, Office of University Research  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70058

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: July 1978

ACKNOWLEDGMENT: DOT

#### 01 170625

##### UNCONVENTIONAL TRACKS

Development of track on concrete base. Various types of rail fastenings are tested in laboratory and on concrete slabs of both in-situ and pre-cast construction. Noise and vibration measurements are made under dense traffic and at high speed. Results obtained from laboratory tests and test track at Radcliffe-on-Trent include vibration and noise comparisons. Apart from experience being compared from main line installations in France, England, Switzerland and Germany, ORE has sponsored tests under high speed at Oelde and tests on sharp curve under dense traffic at Velim. These tests have been completed. A new programme of work is being prepared. The summarizing report was presented to the ORE Control Committee in April 1977.

Seventeen reports have been published to date. Question D87.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1966

ACKNOWLEDGMENT: UIC

#### 01 170636

##### UNIFICATION OF THE GEOMETRY OF POINTS WITH RAILS OF 60 KG/M PERMITTING HIGH SPEEDS ON THE DIVERGING TRACK

The object of this study is to obtain uniformity of turnouts and crossover design with 60 kg/m rails, especially those permitting high speed running on the diverging track. Test runs have been made with the SNCF measuring coach on the SNCF and DR track systems over points with different check rail entry slopes. Furthermore, tests have been made on crossovers of different designs for high-speed running on the SNCF, SNCF, SBB and DB systems. These measurements are now being evaluated. A switch with parabolic transition curve for 160 kg/m on the diverging track will be laid by the SNCF later this year.

Two reports have been published to date Question D121.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

#### 01 170649

##### OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC

The relationship between traffic and track geometry is studied, along with the optimization of levelling and alignment operations and a definition of track supporting structures is given. Reports RP 8 and 9 were submitted to the Control Committee in October 1976. The former report deals with the track in unloaded condition and the latter with the influence of some reinforcement parameters in the performance of the track with regard to level and alignment (processing of statistical data). The definition of track supporting structures is now the main task of the D 117 Committee. The corresponding programme of work was proposed in April 1976 and approved. It has five main points: (1) Study of optimum characteristics of formation materials; (2) Study of measures to be taken against contamination of materials; (3) Study of the mechanism of water penetration into the foundation; (4) Study of the influence of frost; and (5) General dimensioning rules. The first tests were made in the last three months of 1976.

Nine reports have been published to date. Question D117.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970  
 ACKNOWLEDGMENT: UIC

#### 01 170782

##### STRESSES AND DEFORMATIONS IN TRACK STRUCTURES AND SUPPORT 1978/79

The project is now in its final phase, all laboratory work having been completed late in May 1978. A final report, integrating current investigations with the previously-reported results, will be issued. Work completed in the current project year includes repeated-load triaxial testing, an investigation of the effect of grading on ballast performance, plane-stain model footing tests and model circular footing tests.

##### REFERENCES:

A Study of Stresses and Deformations under Dynamic Static Load Systems in Track Structure and Support, Raymond, GP, Canadian Institute of Guided Ground Transport, Report N 75-10, Sept. 1975

Stresses and Deformations in Railway Track Raymond, GP; Lake, RW; Boon, CJ, Canadian Institute of Guided Ground Transport, Report N 76-11, Nov. 1976

Stresses and Deformations in Track Structure and Support Raymond, GP, Canadian Institute of Guided Ground Transport, Report N 77-15

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 2.22.78

INVESTIGATOR: Raymond, GP Tel (613) 547-5904

SPONSORING AGENCY: Transport Canada Research and Development Centre; Canadian Pacific; Canadian National Railways

RESPONSIBLE INDIVIDUAL: Boon, CJ Tel (613) 547-5777

Contract 105-324

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: CIGGT

#### 01 170783

##### DOCUMENTATION AND FIELD VALIDATION OF MULT-LINEAR PORTION OF FINITE ELEMENT PROGRAM CIGGT 3D

The objective of the research program is the development of a three dimensional finite element program suitable as a tool for optimizing the design of a ballasted track structure. The work being carried out under the current contract involves the testing, debugging and validation of the linear portion of the computer program. A draft user's manual will be forthcoming in early 1978. The multi-linear portion will be completed during 1978.

##### REFERENCES:

Analysis of Rail Track Structures (ARTS) User's Manual Raymond, GP; Turcke, DJ, Canadian Institute of Guided Ground Transport, Apr. 1978

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.38.77

INVESTIGATOR: Turcke, DJ Tel (613) 547-5714 Raymond, GP

SPONSORING AGENCY: Transport Canada Research and Development Centre; Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Rowan, WG Tel (514) 283-5068 Lundgren, JR Tel (202) 293-4182

Contract D-500-372-3

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$24,050

ACKNOWLEDGMENT: CIGGT

#### 01 179328

##### TRANSIT TRACK SYSTEMS STUDY

The objective of this study is to evaluate and assess US rapid transit track conditions, design, construction and maintenance problems and practices, and to prioritize research requirements based on this evaluation, life-cycle cost analyses and cost-benefit analyses. Most of the information will be obtained from the transit properties with a resultant track structures data base being established. As part of the contract, a workshop will be held for the purpose of obtaining industry evaluation of the contractor's findings and to solicit recommendations for future research.

PERFORMING AGENCY: Ensco, Incorporated

INVESTIGATOR: Cunney, E Tel (703) 321-9000

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006



Contract DOT-TSC-1502

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$225,678

ACKNOWLEDGMENT: TSC

#### 01 179330

##### DEVELOPMENT OF DATA PROCESSING FOR AUTOMATIC RAIL FLAW DETECTION

This project will provide a feasibility report on real time digital signal processing and pattern recognition technology in the automatic detection and classification of rail defects. Magnetic tape recordings of ultrasonic transducer echos will be used to test the formulated algorithms.

PERFORMING AGENCY: Sperry Univac Computer Systems, 01 160047

INVESTIGATOR: Phipps, PL Tel (612) 456-4872

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Mould, JC Tel (202) 426-1682

Contract DOT-FR-74297

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$220,000

ACKNOWLEDGMENT: FRA

#### 01 179337

##### FUNDAMENTAL PROBLEMS IN RAILROAD TRACK MECHANICS

The objectives of this research are threefold. (1) The derivation and validation of equations for the description of track response to mechanical and thermal loads in the lateral plane. In this, recently derived differential equations will be generalized by including geometrical nonlinearities and the effects of temperature change. To obtain the associated boundary and matching conditions the corresponding variational equation will be derived. Expressions for bending moment, shear and axial forces for the rail-tie system will be used for the physical interpretation of the obtained boundary and matching conditions. Due to errors caused by the transition from the difference equations to the lowest order differential equations for the tie spacings it is also planned to establish a formulation in terms of difference equations. (2) The same objective for the vertical plane. Due to errors of about 10 percent previously found for lateral track deformations caused by

the limiting process which yielded differential equations from difference equations it is expected that a similar situation will also exist for the vertical case. Accordingly, a study similar to that in (1) above will be followed. (3) A critical survey of foundation models. This is to include elastic and viscoelastic models used for the analysis of continuously supported structures which have been introduced since 1964. These are to be analyzed in terms of their uniqueness and physical realism with a view toward establishing a sense of order and suitability for their use in the most recently developed analytical procedures.

PERFORMING AGENCY: Princeton University, School of Engineering and Appl Sci, Aeronautics & Astronaut

INVESTIGATOR: Kerr, AD

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG77-09156

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$25,956

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6620)

#### 01 179687

##### TECHNICAL AND ECONOMIC PRACTICALITY OF DOWEL-LAMINATING CROSSTIES BEFORE DRYING

Reduce the cost of manufacturing dowel-laminated crossties. Reducing this cost will make it more practical to use these crossties which are made from small, low-grade underutilized hardwood trees. Dowel-laminate a number of green oak crossties and compare their quality with those that have been dowelled dry (the conventional method).

PERFORMING AGENCY: Idaho University, Moscow, College of Forestry and Wildlife and Range Sciences, IDA-ES-0128

INVESTIGATOR: Howe, JP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Dec. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072910)

02 058257

**TRACK-TRAIN DYNAMICS RESEARCH PROGRAM, PHASE II**

In a joint international Government-industry program, the Federal Railroad Administration in cooperation with the Association of American Railroads, the Railway Progress Institute, and Transport Canada Research and Development Centre has undertaken a ten-year comprehensive Track-Train Dynamics Research Program to develop a better understanding of the kinematics of railroad performance. This joint research effort is divided into three phases, the first of which has entailed the collection and analysis of data that is necessary to define quantitatively the characteristics of the present railroad system in North America. In the second phase (3 years) this data is to be applied to the development of requirements and interim performance specifications that will lead eventually to the development of improved equipment in the third (5 years) phase of the program. Initially in Phase II investigations will be conducted in the following areas: track structures, wheel-rail contact, trucks and suspension, carbody, couplers and draft gear and the brake system. The descriptive data in this research listing pertains only to that portion of the overall program that is sponsored by the Federal Railroad Administration. This support amounts to approximately one-third of the total resources dedicated to the TTD Research Program.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Moyer, GJ Tel (312) 567-3602

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202) 426-1227

Contract DOT-FR-64228 (CR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: July 1979 TOTAL FUNDS: \$1,900,000

ACKNOWLEDGMENT: FRA

02 058263

**ROLL DYNAMICS UNIT/VIBRATION TEST UNIT FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY**

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Roll Dynamics Unit (RDU) and Vibration Test Unit (VTU) at the Transportation Test Center, Pueblo, Colorado. The RDL will permit analytical and experimental studies of railroad and transit vehicles, systems, and components in a controlled, reproducible lab environment with minimal risk to equipment and personnel. Through the study of vehicle dynamics in the RDL, the number of dynamic related accidents and derailments and their attendant costs should be reduced significantly. The contractor is responsible to deliver a functional RDU and VTU. The RDU will be capable of simulating speeds of approximately 200 mph and will accommodate vehicles up to 108 feet long, 12 feet, weighing 200 tons. The VTU will subject rail equipment to vertical and lateral vibrations experienced on typical track and handle vehicles up to 90 feet long, 12 feet wide and weighing 160 tons.

PERFORMING AGENCY: Wyle Laboratories

INVESTIGATOR: de Benedet, D Tel (303) 597-4500

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

Contract DOT-FR-64200

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$7,868,367

ACKNOWLEDGMENT: FRA

02 058461

**INVESTIGATION OF THE AERODYNAMIC DRAG OF CONTAINERS AND TRAILERS ON FLATCARS**

Wind tunnel tests have been conducted on one fortythird scale models of trailers on flatcars (TOFC) and containers on flatcars (COFC). Various configuration changes to reduce aerodynamic drag were explored. Experiments on very simplified models were also conducted to obtain a fundamental understanding of the phenomena involved. Full scale experiments have been conducted at the DOT Test Center in Pueblo in order to validate the wind tunnel results. Additional wind tunnel measurements at high Reynolds number were performed as a check on scaling effects.

Volume III to be published, Volume IV, See 02A 170594.

## REFERENCES:

Aerodynamics of Freight Trains. Volume I-Wind Tunnel Test of Containers and Trailers on Flat Cars, Available at NTIS, FRA/ORD-76-295-I, Dec. 1976, PB-264304/AS

Aerodynamics of Freight Trains. Volume II-Test Results Report; Full Scale Validation of TOFC (Series II), Available at NTIS, FRA/ORD-76-295.II, Mar. 1978, PB-281823

PERFORMING AGENCY: Hammitt (Andrew G) Associates

INVESTIGATOR: Hammitt, AG Tel 213-541-1328

SPONSORING AGENCY: Transportation Systems Center, 612-0278-AT; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract DOT-TSC-1002 (FFP)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Mar. 1975 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$78,000

ACKNOWLEDGMENT: TRAIS (612-0278-AT)

02 058465

**WAYSIDE DERAILMENT INSPECTION REQUIREMENTS STUDY**

The main objective is to establish the impact and causes of railroad derailments and derailment-related accidents, and to assess existing and possible new wayside inspection means for preventing or reducing the occurrence of these events. It is also the objective to produce an analysis and presentation of derailments and pertinent related matters organized in a manner to facilitate understanding, identification of common characteristics and ultimately, effective methods of correction. Finally, the effort seeks to establish a posture on future action with respect to wayside detection and prevention of derailments: what changes and improvements should be made, and what innovations can best effect improvement with respect to wayside detection and prevention of accidents.

## REFERENCES:

Wayside Derailment Inspection Requirements Study for Railroad Vehicle Equipment, Frarey, JL; Smith, RL; Krauter, AI, FRA/ORD-77-18, May 1977, RRIS 7801 167080

PERFORMING AGENCY: Shaker Research Corporation

INVESTIGATOR: Frarey, JL

SPONSORING AGENCY: Transportation Systems Center, RR-523

RESPONSIBLE INDIVIDUAL: Ehrehbeck, R Tel (617) 494-2273 X2046

Contract TSC-1029 (CPF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: May 1975 TOTAL FUNDS: \$77,114

ACKNOWLEDGMENT: TRAIS, FRA

02 059427

**FREIGHT CAR DYNAMICS RESEARCH PROGRAM**

Develop mathematical models that may be used to understand the dynamic behavior of freight cars and the effects of various truck, car and track design parameters on their behavior. Validate these models with data gathered by the Track-Train Dynamics Program.

PERFORMING AGENCY: Clemson University

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Tsai, N Tel (202)755-1877

Contract DOT-OS-40018 (CR)

STATUS: Active NOTICE DATE: July 1977 START DATE: Nov. 1973 COMPLETION DATE: June 1978 TOTAL FUNDS: \$313,787

ACKNOWLEDGMENT: TRAIS

02 081796

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II**

The objectives of this program are the development of recommended performance specifications and design guidelines for railroad freight cars, track structures, and their components and subsystems. Performance specifications are to coincide with the demands of the dynamic operating environment to which such systems are subjected. Details of methods and scope are included under specific task references.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1979

ACKNOWLEDGMENT: AAR

02 081799

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 2--WHEEL/RAIL

Overall task goals are to improve knowledge of the mechanics of wheel/rail interactions and to establish recommended performance specifications and design guidelines for wheels and rail. Task will involve applied research in wheel and rail metallurgy in order to determine requirements for improved performance. Research will also be conducted in stress analysis and fracture mechanics with the goal of developing improved design techniques and life cycle prediction methods. Stress analysis will especially concentrate on the contact stresses at the wheel/rail interface. Wear research conducted under Task 9, Advanced Analytical Techniques, will supply important input to this task. Rail corrugation, with initial effort by Canadian participants in TTD, has been studied. The rail stress analysis investigation, with particular effort on determining the stresses within rails as developed by passage of a vehicle, is progressing. In the wheel area, present effort is on developing an elastic-plastic stress analysis because mechanical and thermal stresses can go beyond the yield point of steel.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

02 081803

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 7--TEST MANAGEMENT

Task objectives is to coordinate and conduct such tests as are necessary for the pursuit of Tasks 1-6 of Track Train Dynamics, Phase II. Task will provide clearinghouse function for data requests and will design and conduct appropriate laboratory and field tests.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Darien, NJ Tel (312) 567-3621

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1979

ACKNOWLEDGMENT: AAR

02 081804

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 9--ADVANCED ANALYTICAL TECHNIQUES

Task objective is to assure that Track Train Dynamics-Phase II, Tasks 1-6 are equipped with the latest advances in applicable analytical techniques. Task will essentially be performed through contract efforts in such areas as stress analysis, fracture mechanics, and wear properties of ferrous materials.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Moyar, GJ Tel (312) 567-3602

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

02 081805

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 8--PROGRAM ANALYSIS

The objective of this task is to assure economic justification of recommendations which result from research activities conducted in Tasks 1-6 of Phase II of the Track Train Dynamics Program. Task will include prior evaluation of research and implementation strategies to forecast potential economic benefits as an aid to priority determination. Areas selected for priority determination will be selected by program management. The principal technique for priority determination will be lifecycle costing based on data accumulated through existing industry channels supplemented by field surveys. Task will supply economic justification package for final recommendations based on industry status and forecasts and time of release.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: McGovern, WR Tel (312) 567-3617

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

02 099367

## PILOT STUDY FOR THE CHARACTERIZATION AND REDUCTION OF WHEEL/RAIL LOADS

This project will be carried out in two phases, with the first phase developing a method for the analytic and experimental characterization of wheel/rail loads. In addition, this phase will provide a detailed program plan and a W/R load field measurement and data reduction plan for a specified track route that will then be implemented in Phase II. During Phase II, the W/R loads on selected track sections will be determined through implementation of the field measurement plan. These loads will be compared with those predicted through application of the analytical methodology. After modification and/or validation, the prediction method will be used to extrapolate W/R load data to alternative track, vehicle and operating conditions. This is intended to identify alternate strategies for reducing those W/R loads which are most closely associated with track degradation.

REFERENCES:

Evaluation of Analytical and Experimental Methodologies for the Characterization of Wheel/Rail Loads, Ahlbeck, D; Harrison, H; Prause, R; Johnson, M, FRA-OR&D 76-276, Intrm Rpt., Nov. 1976

PERFORMING AGENCY: Battelle Memorial Institute

SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

RESPONSIBLE INDIVIDUAL: Weinstock, H Tel (617) 494-2459

Contract DOT-TSC-1051

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: \$583,000

ACKNOWLEDGMENT: FRA

02 099388

## FREIGHT LOSS AND DAMAGE PROGRAM

This program is based on the evaluation of cost-effective means of damage control and a study of commodities to which various cost effective methods are applicable. It is planned to develop an industry approach to damage control by establishing coordinated programs to demonstrate and evaluate control procedures. The program will be directed toward the control of damage to lading and the economics of such control. Adequate background data is necessary to clearly define any damage problem. It is necessary in certain cases to define the fragility of the product and design laboratory tests to simulate the train environment and produce the same type of damage experienced in transit. Some areas of experimental research provide data on over-the-road shock and vibration and distribution of forces and accelerations in loaded cars under end impact conditions. In cooperation with the Railroad Truck Safety Research and Test Project, the environment during over-the-road operation of a 60-foot box car was determined by extensive instrumentation and recording equipment. This test covered a distance of 5,000 miles over five different railroads. The data, recorded on 22-3600 foot magnetic tapes in analog form was later digitized and sampled in a mini-computer and printed out in a teletypewriter. The data was sampled

at the rate of ten times per second or 36,000 times per hour. It describes vertical, floor and roof lateral acceleration occurrences at both ends of the car and speed occurrences. The data is presented in RMS Illinois Institute of Technology for research on freight have been written to provide additional analyses such as combining data on a hour by hour basis. Data on freight car vibration will serve as input to the Rail Dynamics Simulator at the Transportation Test Center at Pueblo, Colo. At the request of the National Freight Loss and Damage Prevention Committee, and working with the Transportation Committee of the U.S. Brewers Association, a program was undertaken to understand and alleviate the damage to beer in aluminum cans. This program has been completed & a report has been published. AAR has also provided funds to the Illinois Institute of Technology for research on freight damage with objectives of establishing analytical methods of predicting vibration and shock and then to design cost-effective methods for control. A report covering the first year of the two year program has been published. A program recently completely under the AAR University Support Program was directed toward a mathematical computer study of a freight car and lading during impact.

## REFERENCES:

Study on Beer Can Damage-Strength and Dimensional Characteristics of Aluminum, Tin Plate & Tin Free Steel Cans, AAR Rpt R-230, RRIS 02 138569, 7702

Dynamic Simulation of Freight car and Lading During Impact AAR Rpt R-249, RRIS 02 147705, 7701

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: AAR

## 02 099390

#### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS, PHASE II. TASK 10--SPECIAL PROJECT, LOCOMOTIVES

The objective of this task is to review accident statistics relating to derailments due to, or related to, locomotives for the purpose of determining whether or not six-axle locomotives are more prone to derailment than four-axle locomotives. Should the data reveal correlation between truck types and accidents, existing and/or newly developed computer models of locomotive trucks will be utilized for developing strategies for alleviating the problems.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

## 02 128041

#### CALCULATION OF TRAIN AERODYNAMIC DRAG (FOR ENERGY MANAGEMENT PROGRAM)

The purpose of this project is to: 1. Calculate the steady and unsteady aerodynamic drag of vehicles in tunnels and free air. 2. Modify and/or develop computer programs for the calculation of the aerodynamic drag of vehicles as required by the energy management program. A literature survey and review of the aerodynamics of trains in tunnels under project 3603 is well underway. Also, a computer program has been acquired to estimate the unsteady aerodynamic drag of vehicles in tunnels. With this program, it is now possible to start to perform the drag calculations for the purpose of obtaining preliminary power profile and energy loss estimates. It is anticipated that the program will have to be modified to incorporate the latest information obtained in the literature review. This project covers the calculation of aerodynamic drag for the three cases of deep tunnel, cut and cover, and free air, and studies on propulsion systems with and without energy storage. The result, conceptual designs on a total energy basis. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can, 3605

INVESTIGATOR: Colavincenzo, O

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

## 02 138469

#### TRUCK DESIGN OPTIMIZATION PROJECT, PHASE II

Phase II of the Truck Design Optimization Project (TDOP) will finalize the performance and testing specifications and economic methodology generated in Phase I; characterize the performance and economics of Type II, special service freight car trucks; develop performance and testing specifications as well as the economic methodology for Type II trucks incorporating wear and performance indices; provide related economic and analytical models of freight car trucks; and determine the feasibility of advanced designs and integrated carbody support systems.

PERFORMING AGENCY: Wyle Laboratories

INVESTIGATOR: De Benedet, D Tel (303) 697-4500 Cappel, K

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Fay, GR Tel (202) 426-0855

Contract DOT-FR-742-4277

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$2,639,100

ACKNOWLEDGMENT: FRA

## 02 138566

#### LOCOMOTIVE TRUCK DYNAMICS

The purpose of this study is to establish the dynamic performance criteria of locomotive trucks. NASA will obtain experimental parameters, such as stiffness and mass property data, in a format useable for direct application to various dynamic truck models being developed by industry and government.

PERFORMING AGENCY: Marshall Space Flight Center, National Aeronautics and Space Administration

INVESTIGATOR: Furman, J Tel (205) 453-2521

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

Contract DOT-AR-64231

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Apr. 1976 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: FRA

## 02 139178

#### FACILITY FOR ACCELERATED SERVICE TESTING (FAST)

Accelerated life testing of track structures and certain components of rolling stock. A 4.8 mile loop of track, divided into 22 sections, with experiments on rail metallurgy, ties (hardwood, soft wood, concrete, steel), ballast (different materials, depths, shoulder width), etc. Four 2,000 HP locomotives pulling more than 80 cars (hoppers, tanks, flats) each grossing over 100 tons, at average speed of 42 MPH for a period not to exceed 16 hrs/day five day/week. Measurements taken during other 8 hours. Started operation in September 1976; approximately 255 million gross tons and 135,000 miles have been accumulated thru June 1, 1978. Experiments which have been completed include those involving wheel wear, steel ties, frogs and fabricated trucks. Reports covering the results on these completed experiments are currently in preparation.

PERFORMING AGENCY: Federal Railroad Administration, Office of Research and Development

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Spanton, DL Tel (202) 426-0850

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1976

ACKNOWLEDGMENT: FRA

## 02 148322

#### APPLICATIONS OF DISTURBANCE ACCOMMODATING CONTROL THEORY TO VEHICLE ACTIVE RIDE CONTROL PROBLEMS

"Active ride control" is an important aspect of high-speed transportation systems since irregularities of motion produce distress to occupants and

increased wear on the vehicle and/or guideway. Active ride control is achieved through the application of compensating forces in response to disturbances detected through the use of electronic sensing devices. The primary objective of the research is to explore the application of the theory of "disturbances accommodating controllers" (DAC) to the active ride control problem. A suitable mathematical model of a vehicle suspension system shall be chosen, and a DAC shall be designed as an active ride controller for the mathematical model. The DAC ride controller derived in this study shall be in mathematical equation form and will be compared to derived statistical types and other known forms of active ride controllers. The comparison will involve various aspects of the DAC's performance. Evaluations of DAC feasibility will result. As electronic information processing becomes progressively less expensive, it becomes worthwhile to investigate these techniques as an alternative to expensive structural solutions based in materials improvement.

PERFORMING AGENCY: Alabama University, Huntsville, Department of Electrical Engineering  
 INVESTIGATOR: Johnson, CD  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Mengert, PH

Contract DOT-OS-60126  
 STATUS: Completed NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$26,121  
 ACKNOWLEDGMENT: DOT

#### 02 148358 EXPERIMENTAL RESEARCH ON RAIL VEHICLE SAFETY USING DYNAMICALLY SCALED MODELS

The objective of this research is to develop experimental techniques for the study of rail vehicle dynamics. Through the use of scaled models, a structural experimental data base on the characteristics of rail car trucks will be assembled. The establishment of this data base (more complete and systematically structured than that feasible from large scale testing) will enable the validation of analytical tools useful in the design of railroad components. An 800 foot test track has been installed and experiments have been conducted on single wheelsets. These confirm predictions from a theoretical model developed for this project. Additional experiments will focus on the dynamics of a complete freight truck.

PERFORMING AGENCY: Princeton University, Department of Aerospace and Mechanical Sciences  
 INVESTIGATOR: Sweet, LM Tel (609) 452-5305  
 SPONSORING AGENCY: Department of Transportation, Office of University Research  
 RESPONSIBLE INDIVIDUAL: Lee, HS

Contract DOT-OS-60147  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: \$203,000  
 ACKNOWLEDGMENT: TSC

#### 02 157664 EXPERIMENTAL MEASUREMENTS OF NORMAL SHOCK AND VIBRATION ENVIRONMENTS

Extract and document, in a usable format, the current information on normal shock and vibration loading experienced by radioactive material shipping containers. This will involve: (1) Extraction of data from existing data banks; (2) Conducting of dynamic analysis of switching and coupling shocks; (3) Participation in appropriate test programs.

REFERENCES:  
 Shock and Vibration Environments for Large Shipping Containers on Rail Cars and Trucks, Magnuson, C, SAND-76-0427; NUREG-76-6510, May 1977

PERFORMING AGENCY: Sandia Laboratories, A-1049  
 INVESTIGATOR: Magnuson, CF Tel (505) 264-2765  
 SPONSORING AGENCY: Nuclear Regulatory Commission  
 RESPONSIBLE INDIVIDUAL: Lahs, W Nuclear Regulatory Commission  
 Tel (301) 427-4356

Contract B&R-60190504  
 STATUS: Active NOTICE DATE: July 1977 START DATE: Dec. 1975 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$365,000  
 ACKNOWLEDGMENT: Nuclear Regulatory Commission

#### 02 160409 PACKAGING DYNAMICS OF FREIGHT LADING

The objective is to determine dynamic mechanical response lading parameters such as force constants and damping coefficients. Engineering data of this type is necessary to determine the response of various lading as it is influenced by vibration, variations in shipping containers and pallet configurations and in the development of predictive models to be used in optimizing the rail transportation system comprised of lading, rail cars and track structures.

PERFORMING AGENCY: Rutgers University, New Brunswick  
 SPONSORING AGENCY: Federal Railroad Administration

Contract DOT-FR-767-4323 (CC)  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: July 1978 TOTAL FUNDS: \$65,253  
 ACKNOWLEDGMENT: TRAIS

#### 02 170591 EXPERIMENTAL DETERMINATION OF COEFFICIENT OF ROLLING ADHESION IN RAIL TRACTION AND BRAKING

The coefficient of rolling adhesion is strongly a function of speed and material, but also is influenced by other parameters, such as surface condition, curvature, traction or braking in the stress contact area. It has never yet been well-determined in these respects, and a VPI test rig of my design has now produced some definitive results never before achieved.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, 808440-1  
 INVESTIGATOR: Whitelaw, RL Tel (703) 951-6801  
 SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$67,000  
 ACKNOWLEDGMENT: Virginia Polytechnic Institute & State University

#### 02 170594 INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF RAIL FREIGHT ROLLING STOCK

The objective of this project is to obtain information on the aerodynamic characteristics of a variety of standard railroad freight rolling stock and of selected configurations, modified to improve their aerodynamics, by means of a series of scale-model wind tunnel investigations. The final report shall indicate applicability and limitations of the test data to full-scale railroad operations.

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract DOT-FR-8058  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1978 COMPLETION DATE: May 1979 TOTAL FUNDS: \$53,684  
 ACKNOWLEDGMENT: FRA

#### 02 170595 TRAIN RESISTANCE

Investigations and analyses of rail freight train aerodynamic and mechanical resistances are being conducted to assist the FRA/OR&D in developing an overview of both near-term and long-range considerations of energy requirements for improved rail freight service. This effort will utilize results of on-going FRA aerodynamic research on various types of rail rolling stock and previous rail energy-related studies conducted by government and industry. Potential energy benefits resulting from freight car design or operational modifications will be assessed from technical and economic considerations.

Train Resistance in Rail Freight service, 1977. Paper presented at 4th National Conference: Effects of Energy constraints on Transportation Systems. Union College, Schenectady, NY. John Koper, Office of Res & Dev/FRA, DOT. Volume II to be published.

REFERENCES:  
 Resistance of a Freight Train to Forward Motion Volume I Methodology and Evaluation, Muhlenberg, JD, Available at NTIS., FRA/ORD 78/04.I, Apr. 1978, PB-280969/AS

PERFORMING AGENCY: Mitre Corporation, Metrek Division, 06.30.09.200  
 INVESTIGATOR: Muhlenberg, JD Tel (703) 790-6692  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Re-

search and Development

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

30000

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977 COMPLETION DATE: Jan. 1979

ACKNOWLEDGMENT: FRA

#### 02 170642

##### ADHESION OF LOCOMOTIVES FROM THE POINT OF VIEW OF THEIR CONSTRUCTION AND OPERATION

Adhesion problems with motive power units and adhesion measurement methods; influence of the speed, the axle load, the wheel diameter, the wheel profile, the elasticity of the traction force transmission, the type and the characteristics of the electric traction motors, the regulating systems, the track characteristics, sanding, the types of wheel tire steel, the driving axle arrangement and the flexibility of the suspension. Problems studied through field tests using a special "Test machine 18,000". Present State: The final report (summarising report) is being prepared for presentation in April 1978.

Thirteen reports have been published to date. Question B44.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: 1963

ACKNOWLEDGMENT: UIC

#### 02 170644

##### PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS

In April 1975 the B 55 Specialists Committee presented report RP 6 "Conditions for negotiating track twists. Calculation and measurement of important vehicle parameters" which gives guiding principles to the vehicle designer. These will enable him to examine new rolling stock for its safety against derailment on track twists as early as the design stage. In addition, the methods of measurement and the evaluation of the principal vehicle parameters are specified. It is planned to incorporate these conditions in the specifications and the programme of tests for new rolling stock. Further work of the Committee will aim at supplementing the recommendations given in report RP 6 by guiding principles for the cant dependent on the radius of the curve. This still requires the study of its effects on the guiding force. The studies were initiated by a detailed inquiry among the ORE administrations and they are, at present, continued by extensive tests on 2 administrations. Publication of a report of inquiry RE 7 with requisite conclusions is scheduled for October 1977. The final report, RF 8, supplementing report RP 6 will be presented in April 1978.

Seven reports have been published to date. Question B55.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1965 COMPLETION DATE: Apr. 1978

ACKNOWLEDGMENT: UIC

#### 02 170645

##### BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURE

Study of braking and starting forces on bridges, is now expanded to interaction between long welded rails and bridges. Initial program included tests on plain line to evaluate magnitude and sequence of tractive and braking reactions, tests on steel bridges with and without ballast, and multiple span bridges, to develop theory and recommendations for code of practice. Tests on steel bridges and plain line together with theoretical studies have provided basis for provisional recommendations. Further work is needed to verify reactions on a bridge with continuous deck. The theoretical and experimental methods already developed by the Committee will contribute towards study of temperature reactions from long welded rails, and appropriate arrangements will be combined in future testing.

Eleven reports have been published to date. Question D101.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968

ACKNOWLEDGMENT: UIC

#### 02 170648

##### INTERACTION BETWEEN VEHICLES AND TRACK

Track irregularity spectra, setting up a mathematical model (track and vehicle), specification of vehicle/track conditions for ensuring adequate contact, extending knowledge about the wheel/rail contact zone. At this time, work is being done on: 1. Further development and finalisation of the mathematical model for bogie vehicles; 2. Study of comfort standards; and 3. Optimisation of track parameters.

Eight reports have been published to date. Question C116.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 02 170657

##### EFFECT ON THE TRACK OF RAISING THE AXLE LOAD FROM 20 TO 22 T

It is intended to study the effect of raising the axle load through simulation tests and full scale tests on the Velim test loop. At this time track tests are at present being carried out in varying the values of different parameters such as rails, sleepers and ballast, and for each axle load. Ballast settlement tests are also being made for symmetric and asymmetric wheel loading. In addition, in cooperation with the B 142 Committee, tests are being conducted on the Velim loop with a test-train with 22 t axle load. A first series of tests, corresponding to 50 million tonnes of traffic, has now been terminated.

Question D141.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976

ACKNOWLEDGMENT: UIC

#### 02 170660

##### PERMISSIBLE MAXIMUM VALUES FOR THE Y AND Q FORCES AS WELL AS THE RATIO Y/Q

The studies are being carried out in 3 directions: 1) Track displacement forces S: the quasi-static tests carried out at Bucharest on a specially fitted track are practically terminated as far as the bogie wagon is concerned and also the line tests with measurements of dynamic forces being carried out by FS, which will be continued by measurements on the test rig by PKP. 2) Criterion of derailment: new series of tests will be made in Derby and in Bucharest toward the end of the year and also on SBB. 3) Limiting values for Y and Q: The additional calculations and the practical work of verifying them will be undertaken by PKP and CFR.

One report has been published to date. Question C138.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

#### 02 170661

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III

This phase contains new tasks not dependent on completion of Phase II work, as well as some of the longer range subtasks of Phase II that were not yet undertaken. The Phase III program, projected to cover a period of five years, has as its goal the development of requirements for advanced systems to meet the future needs of America's railroads as well as the introduction of advanced technology to improve the safety and reliability of present systems. The first stage of Phase III will last about two years and has four major tasks: TTD technology sharing and implementation; advanced design methodology development; train operation aids; and future system studies.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Moyer, GJ Tel (312) 567-3602

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1982

ACKNOWLEDGMENT: AAR

02 170663

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 2--ADVANCED DESIGN METHODOLOGY DEVELOPMENT

This task will integrate & apply analytical & experimental techniques to provide a validated design evaluation system to assist in the prevention of catastrophic mechanical failures and support advanced system development in the railroad industry. The subtasks: (2.1) Adapt and illustrate a prototype interactive graphics-supported design evaluation capability; (2.2) Use the Rail Dynamics Laboratory at Pueblo, Col., to validate structural dynamics, freight-car models and component design methods; (2.3) Complement load-environment data on track structures with investigations of ultimate track strength; (2.4) Conduct a controlled investigation of locomotive or heavy-vehicle/track interactions; (2.5) Provide up-to-date data on fatigue, fracture and wear for railroad materials in a form suitable for advanced design.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hamilton, AB Tel (312) 567-3649

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

02 170666

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE II

The overall goal is development of recommended performance specifications and relevant design guidelines to assure the safety of railroad operations with current generation track and equipment. Although originally programmed to end in 1977, many of its subtasks are not complete and some contracts will carry into and beyond 1978. Phase II work continues in these areas: Field testing, wheel/rail integrity studies, dynamic analysis, and specification guidelines. Field tests will complete wayside track data collection at six sites, implement an over-the-road load environment sampling with an instrumented six-car consist, measure wheel thermal/mechanical environment in typical revenue service, and use instrumented brake shoes in single-car stopping and drag brake testing. Wheel/rail integrity studies will publish findings of first-stage wheel/rail and centerplate laboratory wear research, determine residual stress states in rail, validate a risk model that relates rail inspection methods to probability of flaw propagation, develop cost-effective methods to detect damaged wheels. Dynamic analysis will complete final report on harmonic roll and bounce of freight cars due to track irregularities, complete the analytical representation and optimization of draft gear and cushioning units, evaluate results of auxiliary snubbing tests, complete

evaluation of truck hunting, issue final evaluation report on instrumented-wheelset tests performed on Amtrak locomotive. Complete specifications for fatigue tests for couplers and truck bolsters; promote introduction of fatigue design guidelines and wheel stress limits into AAR specifications.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

02 179333

## TIEDOWN OF NUCLEAR FUEL CASKS TO RAILCARS

An experimental program has been undertaken jointly by the Savannah River Laboratory (with DOE funding) and the Sandia Laboratories (with NRC funding) to investigate shock, vibration, accelerations, stresses, and tiedown forces in a cask-car system during car coupling operations. Results will be extended beyond the experimental range by analytical methods. A standard for tiedown of casks to railcars is to be developed.

PERFORMING AGENCY: Du Pont de Nemours (EI) and Company, Incorporated, Savannah River Laboratory

INVESTIGATOR: Petry, SF Tel (803) 824-6331 Magnuson, CF

SPONSORING AGENCY: Department of Energy; Nuclear Regulatory Commission

RESPONSIBLE INDIVIDUAL: May, GW Tel (803) 824-6331

Contract AT (07-2)-1

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$315,000

ACKNOWLEDGMENT: Du Pont de Nemours (EI) and Company, Incorporated

02 179342

## DYNAMICS OF LARGE SYSTEMS

The research program will investigate the dynamics of large structural systems, such as those encountered in the study of human motion, and in problems involving the motions of flexible space vehicles and road vehicles. The objective is to facilitate both the formulation of the governing equations and the extraction of useful information from these equations, and to apply these general concepts to selected specific problems.

PERFORMING AGENCY: Stanford University, School of Engineering, Applied Mechanics

INVESTIGATOR: Kane, TR

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG77-04449

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$60,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6476)



03 025403

**URBAN RAPID RAIL VEHICLE SYSTEMS PROGRAM**

To enhance the attractiveness of rapid rail transportation to the urban traveler by providing existing and proposed transit systems with service that is comfortable, reliable, safe, and as economical as possible. Short range goals: Demonstration of the state-of-the-art in rapid rail vehicular technology. The Advanced Concept Train (ACT-1) phase calls for delivery of two next generation rail transit vehicles by August 1977 and Advanced Subsystems Development Program (ASDP) calls for component development for near-term industry application.

Subcontractors for the project are St. Louis Car Company, AiResearch Manufacturing Company, Delco Electronics, Westinghouse Air Brake and the Budd Company.

PERFORMING AGENCY: Boeing Vertol Company

INVESTIGATOR: O'Brien, T Tel (215) 522-3200

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1971 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: \$45,700,000

ACKNOWLEDGMENT: UMTA (IT-06-0026)

03 046502

**RAILROAD WHEEL INVESTIGATION**

An analytical elastic solution to determine the stresses developed in a railway car wheel when subjected to axisymmetric heating is being used to evaluate different geometric designs. The theory is being extended to include inelastic analysis which should permit the determination of residual stresses developed in the wheel. When an adequate mathematical model is developed to predict the temperature influenced stresses in a car wheel, these stresses will be superimposed on the stresses developed by the railroad. These results should lead to a better understanding of the various types of failures experienced in service.

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics

INVESTIGATOR: Wetenkamp, HR

SPONSORING AGENCY: Griffin Wheel Company

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971

ACKNOWLEDGMENT: Science Information Exchange (JGF 25)

03 050338

**ARTICULATED RAIL CAR TRUCK DEVELOPMENT**

Develop a dramatically improved freight car truck. Background information is also being applied to basic design of (a) locomotives, (b) rapid-transit cars, and (c) passenger cars. Design, build, and test 100 ton capacity freight car trucks based on retrofitting existing 3-piece freight car trucks to give radial-steering, referred to as the Type DR-1. Testing to 90 mph under empty and loaded car with worn wheels indicates that basic design and principles are sound. Curving tests indicate a dramatic improvement in rail and wheel life. Multiple units now being manufactured by Dofasco in Canada, and Dresser in the U.S. for actual service testing. AAR certification has been received. Several U.S. and Canadian railroads will conduct service tests.

**REFERENCES:**

An Evaluation of Recent Developments in Rail Car Truck Design, List, HA, ASME #71-RR-1, Apr. 1971, RRIS #050340 in 7401

Proposed Solutions to the Freight Car Truck Problems of Flange Wear and Truck Hunting, List, HA; Cardwell, WN; Marcotte, P, American Society of Mechanical Engineers, ASME #75-WA/RT-8, July 1975, RRIS #128632 in 7601

The DR-1 Radial Truck, A Significant Advance in Freight Car Truck Technology, DOT Engineering Conference, Pueblo, Colorado, Oct. 1977

PERFORMING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited

SPONSORING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited

RESPONSIBLE INDIVIDUAL: List, HA Cope, GW Bexon, H

In-House

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1971 COMPLETION DATE: 1978

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated, Dresser Transportation Equipment Division, Dominion Foundries and Steel, Limited

03 055604

**A STRUCTURAL SURVEY OF CLASSES OF VEHICLES FOR CRASHWORTHINESS**

It is the purpose of this contract to provide the technical data required for the evaluation and improvement of the crashworthiness of several classes of rail vehicles as required in the rail safety effort. This contract is also to provide preliminary technical data for planning of possible future crashworthiness tests efforts.

PERFORMING AGENCY: Boeing Vertol Company

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Tong, P Tel (617)494-2539

Contract DOT-TSC-856 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$239,139

ACKNOWLEDGMENT: UMTA, TRAI

03 055636

**RAIL SAFETY/EQUIPMENT CRASHWORTHINESS**

The Transportation Systems Center (TSC) is providing technical assistance to the Federal Railroad Administration (FRA) in a program directed at improving railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other areas. As part of this program TSC is conducting technical analyses of passenger railcar collisions, derailments, and other accidents, directed toward minimizing occupant injuries.

PERFORMING AGENCY: Boeing Vertol Company

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Tong, P Tel (617)494-2539

Contract DOT-TSC-821

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: June 1978 TOTAL FUNDS: \$137,064

ACKNOWLEDGMENT: FRA

03 055774

**DEVELOPMENT OF DATA TO IMPROVE DESIGN CRITERIA OF RAILROAD WHEELS**

To measure the mechanical loads and thermal gradients due to tread braking on railroad wheels in actual service; to determine the major wheel stresses resulting from these loads and thermal effects; and to develop improved wheel service life criteria.

PERFORMING AGENCY: IIT Research Institute

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Steele, RK Tel (617)494-2457

Contract DOT-TSC-855 (CPFF)

STATUS: Completed NOTICE DATE: June 1978 START DATE: June 1974 TOTAL FUNDS: \$202,000

ACKNOWLEDGMENT: TSC (PR # TME-0120)

03 055916

**IMPROVEMENT OF RAILROAD ROLLER BEARING CERTIFICATION TEST PROCEDURES AND DEVELOPMENT OF ROLLER BEARING DIAGNOSTICS**

The problem of railroad roller bearing failure shall be reviewed giving consideration at a minimum to the effects of the following factors: 1. over and under lubrication. 2. loose bearing components (i.e. cap screws, seals, backing rings). 3. bearing component design. 4. adaptor condition. 5. rebuild procedures. 6. environment (speed, load, temperature). The interaction of factors leading sequentially to different modes of failure should be clearly established. An analytical model of the bearing may be useful in assessing the importance of interaction between these factors leading to bearing failure. Under a modification to the contract concepts for railroad roller bearing detection systems are to be evaluated. These systems are: 1. On-board Thermally Powered Transmitter Bolt; 2. Pulse Echo Ultrasonic Lubrication Detector, and 3. Shock Pulse Damage Detector.

A Final Report is in preparation.

PERFORMING AGENCY: SKF Industries, Incorporated  
 INVESTIGATOR: Allen, G Tel (215) 265-1900  
 SPONSORING AGENCY: Transportation Systems Center, RR-523  
 RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (617)494-2046  
 Contract DOT-TSC-935 (CPFF)  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1974 COMPLETION DATE: Aug. 1977 TOTAL FUNDS: \$113,885  
 ACKNOWLEDGMENT: TRAIS (RR-523)

03 059136

## ACOUSTIC SIGNATURE OF RAILROAD WHEELS

1) Develop a wheel exciter to assure reliable, uniform and repeatable impact of excitation at an optimum location of a passing railcar wheel and to achieve sufficient ruggedness of construction to withstand field conditions. 2) Develop and document data to permit discrimination between a defined flawed wheel and a non-flawed wheel, based upon the demonstrated ability of this technique to identify rim cracks, plate cracks, both in depth and size. A Final Report is in preparation.

PERFORMING AGENCY: Houston University  
 INVESTIGATOR: Finch, RD  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Thomspson, WI Tel (617) 494-2511  
 Contract DOT-TSC-1187 (CR)  
 STATUS: Active NOTICE DATE: Feb. 1978 COMPLETION DATE: May 1978 TOTAL FUNDS: \$73,000  
 ACKNOWLEDGMENT: TRAIS

03 059345

## PROVIDE RESOURCES FOR TESTING OF THERMALLY SHIELDED TANK CARS

No Abstract.

PERFORMING AGENCY: Federal Railroad Administration, Department of Transportation  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Tong, P Tel (617) 494-2539  
 ID DOT-RA-76-44 (CR)  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: July 1976 TOTAL FUNDS: \$250,000  
 ACKNOWLEDGMENT: TRAIS

03 059420

## PERFORMANCE EVALUATION OF LIGHTWEIGHT INTERMODAL FLAT CARS

Measurement of ride vibration and wear characteristics of two experimental lightweight skeleton TOGC and COFC flat cars in addition to standard TTAX car. Program includes 150,000 miles of revenue service with periodic measurements of ride vibration and wear.

Co-sponsored by an industry group including the Trailer-Train Company, Pullman-Standard Division, National Castings Division of Midland Ross, American Steel Foundries Company.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway; ENSCO, Incorporated  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Blanchfield, JR Federal Railroad Administration Tel (202)426-0808  
 Contract DOT-FR-65218  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1976 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$750,000  
 ACKNOWLEDGMENT: TRAIS

03 059965

## TEST PLAN FOR ASSESSING STRESS STATES AND TEMPERATURES OF NEW RAILROAD WHEELS

The objective is to develop a test plan for assessing the stress states and temperatures of new railroad wheels under the following conditions: 1) No external loads (residual stress state); 2) dynamic vertical loads; 3) dynamic lateral loads; 4) combined lateral and vertical dynamic loads; 5) normal slow down and drag braking; and 6) emergency braking from 60 mph and 100 mph.

PERFORMING AGENCY: Small Business Administration

SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

Contract DOT-FR-74288 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$97,993

ACKNOWLEDGMENT: TRAIS

03 081786

## RAILROAD COUPLER SAFETY RESEARCH AND TEST PROJECT

Because of the recognition of a general lack of knowledge regarding the environment to which couplers and yokes are subjected because of the increased power from modern locomotives, higher operating speeds and increased use of high capacity cars, this project has as its objectives: (1) Study the operating and service conditions of couplers and yokes; (2) Investigate the technical, economic and safety aspects of coupler failures in service; (3) Evaluate standard coupler and yoke designs; (4) Prepare detailed guidelines for the proposed performance and test specifications for couplers and yokes; (5) Conduct a preliminary evaluation of current standard designs of coupler components under conditions listed in Item 4. Data has been acquired from instruments installed in a special test box car which has operated in various services. With service testing nearly complete, attention is now being given to laboratory tests required for recommendations for purchase and acceptance specifications. Fatigue and fracture toughness characteristics of steels used in couplers and the stress levels in the components must be determined. Agreement has been given to merge this project into Phase II of the Track-Train Dynamics Project, Task 5. All of the objectives of the Coupler Safety Project will be retained.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute  
 INVESTIGATOR: Morella, NA Tel (216) 229-3400  
 SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute  
 RESPONSIBLE INDIVIDUAL: Morella, NA Tel (216) 229-3400  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1972  
 ACKNOWLEDGMENT: AAR

03 081787

## RAILROAD TRUCK SAFETY RESEARCH AND TEST PROJECT

This project has the objective of developing guidelines for new specifications for truck bolsters and side frames to meet the increasingly strenuous demands of rail freight transportation. Road service environmental tests to measure loads/stresses to which components are subjected under all types of operating conditions are essentially complete. IITRI reduction and analysis of recorded data is being translated to methods of laboratory bolster dynamic tests. Initial lab tests of 1975 and 1976 were conducted at the Test Engineering Department of American Steel Foundries. Further lab testing started in November, 1976, and continues into 1977 at the Testing Laboratory of Dresser Transportation Equipment, Division of Dresser Industries. Additional lab testing is projected for 1978, at the AAR Technical Center, to broaden the experience base and to validate proposed guidelines for an interim bolster fatigue test specification. This work is to be used as environmental and physical test basis for the Track Train Dynamics Phase II task on trucks.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute  
 INVESTIGATOR: Evans, RA Tel (312)567-3598  
 SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute  
 RESPONSIBLE INDIVIDUAL: Evans, RA Tel (312)567-3598  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973 TOTAL FUNDS: \$230,000  
 ACKNOWLEDGMENT: AAR

03 081798

## INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 3--TRUCKS AND SUSPENSION

Overall task objectives are the development of recommended performance specifications and test specifications for conventional three piece trucks. Specifications will be developed through a comprehensive research project

built upon the RPI-AAR Railroad Truck Safety Research and Test Project and utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. Test specification development will involve determination of service loading and development of techniques necessary for predicting failure under dynamic loads. Task will also involve developing capability to fatigue test truck components. Field testing will include validation of the truck stability model developed by Clemson University and Arizona State University in conjunction with FRA and the TTD program. The model evaluates dynamic stability of a truck under a wide variety of service conditions and validation will enable it to be used in the study of phenomena such as truck hunting. The Harmonic Roll Series computer programs have been used to show how suspension characteristics could be matched with the vehicle to alleviate problems related to rock and roll and harmonic bounce.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Love, R

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

### 03 081800

#### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 4--CAR STRUCTURES

Task objective is the development of recommended performance specifications and design guidelines for railroad freight car structures. Method will involve development of suitable fatigue analysis approach coupled with evaluation of advanced structural analysis methods. Task will include establishing test program goals for environmental loading tests to be pursued during the program. Test plans will be developed and tests conducted to validate fatigue analysis methods for car structural components. The basic approach adopted is a cumulative damage approach using the methodology which has been used in the aerospace and heavy-equipment industries. Development of interim guidelines using this methodology and presently available load spectrum and material fatigue performance was made available to TTD by ACF Industries. Further work in fatigue methodology and acquisition of additional load spectra from environmental sampling is progressing.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Halcomb, S Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

### 03 081801

#### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 5--COUPLERS, DRAFTGEAR, AND CUSHION UNITS

Task objectives are development of recommended performance and/or test specifications and design guidelines for railroad freight car couplers, draftgear, and cushion units. Task will build on current RPI-AAR Railroad Coupler Safety Research and Test Project and will utilize dynamic simulation computer models developed during Phase I of the Track Train Dynamics Program. Coupler effort will concentrate on stress and fatigue analysis. Draft gear and cushion unit efforts will be directed toward investigations of opportunities for improved train handling through optimized operating characteristics.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport

Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

### 03 099382

#### WHEEL RESEARCH PROGRAM

It is the objective of this program to prevent the formation of cracks in various wheel locations which can occur because of various conditions and can ultimately result in catastrophic failure. The initial step was a full review of wheel failure statistics to isolate wheel contours generating the most frequent failures. The problem is to be alleviated by considering changes in wheel design and wheel material, with emphasis on design. Finite element analysis is conducted on each characteristic shape of wheel involving stress due to tread loading, lateral loading and to thermal inputs resulting from drag or emergency braking. Such analysis would be followed by service or dynamometer tests to verify results. The initial phase of this involved the 28-inch wheel and was a joint project with Trailer Train Co. It involved cracked wheel plates and shattered rims, and indicated some solutions which would be generally applicable. In addition to the loading problems, research is being conducted to define problems associated with overheated wheels. It was initially found that criteria for rejecting such wheels were overly restrictive. Non-destructive residual stress measurement techniques, such as the Barkhausen method, are being evaluated for detecting thermally damaged wheels. The thermal fatigue behavior of wheel steels is also being investigated. Detection of rim thermal cracks, utilizing ultrasonic techniques like those used in AAR's rail test program, are also proceeding.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1976

ACKNOWLEDGMENT: AAR

### 03 099426

#### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 9-DESIGN STUDY-TANKS AND ATTACHMENTS

Phase 09 concerns the behavior of tank car tanks and their appurtenances (fittings and attachments) in the mechanical environment of railroad accidents. The objectives are to study designs of tank shells, fittings and attachments in relation to the potential of product loss under mechanical impacts in accidents and to analyze, on a cost-effective basis, the feasibility of reducing losses through design improvements. This general area of study will continue under the Project. Currently, an extensive series of tests are underway. The tests include impact testing of several bottom outlet configurations and protective skid proposals. The objectives are to develop design parameters for bottom fittings breakage grooves and protective skids.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Aug. 1978 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

### 03 099432

#### ADVANCED COUPLING CONCEPTS PROJECT

The objectives of the Advanced Coupling Concepts project are: 1) To determine areas in which safety and efficiency could be improved by changes in the coupling system. 2) To quantify value to be achieved by such improvements. 3) To define functional requirements in the form of a specification to guide development of improved systems. The scope includes all functional elements essential to interfacing of railroad cars and locomotives including mechanical couplers, train lines, etc. An economic model is to be developed and data collected to evaluate new coupling concepts individually and as logically assembled systems.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Punwani, SK Tel (312) 567-3601

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

Contract TSC-1087 (CPFF)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: 1974  
TOTAL FUNDS: \$92,296

ACKNOWLEDGMENT: AAR

## 03 099435

### LOCOMOTIVE CAB DESIGN DEVELOPMENT

The objective of this effort is the development of a locomotive control compartment based on an evaluation of the operator's functional requirements and comprehensive human factors engineering studies. The contractor has developed specifications for the design, test, and evaluation of a locomotive cab which are in concert with all operational, human factors, safety, and occupant protection considerations. The cab design incorporates the predictable technical and operational progress, as well as 10 to 15 year projections of train handling and control requirements. In Phase I of the original contract, a number of potentially feasible conceptual alternative locomotive cab configurations were developed. The most suitable alternate was selected on the basis of human factors, structural integrity, and cost trade-off studies. In Phase II of the original contract, a detailed human factors design of the optimal locomotive cab was accomplished, and a full scale mock-up fabricated. Operational feasibility was determined in a limited series of performance tests utilizing the mock-up. Under the present contract the scope of the test programs was increased to include a nationwide sample of evaluators from heavy rail properties. The sample consisted of engineers and trainmen representing geographic, operational and experimental variables necessary to accomplish a broad based evaluation. As a result of the evaluation, human factors engineering functional specifications for a new locomotive cab were written to include requirements for all man/software/hardware interfaces of the cab design. In addition, recommendations were made on appropriate areas for further work, including suggestions for areas other than the immediate cab environment, such as the potential for new methods of train handling, communication techniques, and signalling systems.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass. Locomotive Cab Design Developments V4, Final Report, Robinson, J, FRA/ORD-76-275 IV, (in preparation).

#### REFERENCES:

PERFORMING AGENCY: Boeing Vertol Company, D339-10044  
INVESTIGATOR: Robinson, J Tel (215) 522-2760  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Devoe, DB Tel (617) 494-2199

Contract DOT-TSC-1330

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1977  
COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$451,619

ACKNOWLEDGMENT: FRA

## 03 099439

### HOT JOURNAL SENSOR AND LOCAL DERAILMENT DETECTOR

This multi-year program is aimed at reducing the number of train derailments. Active anti-derailment devices are needed by the railroad industry which when installed on a train will automatically stop the train upon detection of a hot journal or a wheel on the ground. NAVSURFWPCEN/WOL will develop, install and initiate in-service demonstrations of the Hot Journal Sensor (HJS) & the Local Derailment Detector (LDD) on a limited number of railroad cars. Hot box tests, over-the-road shock tests and normal bearing tests have been conducted on the Duluth, Missabe & Iron Range Railway at Duluth, Minn. Data from these tests will establish a design base for both the LDD and HJS. Laboratory testings has been conducted on a piezo-electric power source for an electro-explosive HJS device.

PERFORMING AGENCY: Naval Surface Weapons Center  
INVESTIGATOR: O'Steen, JK  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

IA AR54162

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

## 03 136342

### DESIGN OF AN ADVANCED CONCEPT TRAIN

Description: The object of this project is to demonstrate new concepts for the subway and commuter rail car industry. These concepts will reduce life cycle costs; increase passenger appeal; and reduce the impact on the environment. Two vehicles are being built for test and evaluation at TSC. The methods for reducing life cycle costs are: 1. An efficient propulsion system which stores the vehicle braking energy in a flywheel to be used later to accelerate the vehicle. All accessories are shaft driven from this flywheel. 2. Reliability-Designing for reliability and designing parts out of the vehicle. 3. Designing more maintainable equipment. 4. Reducing operating personnel by automaticity and closed circuit T.V. monitors. 5. Reducing track wear thru a better slip-slid control and better ride quality. Less environmental impact thru: 1. Reduced noise using composite wheels. 2. Less thermal emission since the braking energy is stored as rotational energy interferences due to advanced propulsion design.

PERFORMING AGENCY: AiResearch Manufacturing Company; Boeing Vertol Company

INVESTIGATOR: O'Brien, T

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1972  
COMPLETION DATE: Aug. 1978

## 03 138537

### GAS TURBINE-ELECTRIC (GT-E) COMMUTER CARS

The objective is to develop advanced dual powered commuter cars capable of gas turbine or electric propulsion which is equivalent to all-electric car performance, and can provide a no-change ride to suburbs beyond electrified territory. Four GT/E cars were built by General Electric and four by Garrett AiResearch. Two Garrett cars were tested briefly at the DOT Transportation Test Center, Pueblo, Colo. All eight cars were tested in non-revenue service beginning in 1975 on the Long Island Rail Road, and entered revenue service in 1976 for a 12 month evaluation period.

Subcontractors are Garrett AiResearch and General Electric Company and Louis T. Klauder and Associates.

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0006

SPONSORING AGENCY: Urban Mass Transportation Administration; Metropolitan Transportation Authority (New York)

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090

Contract DOT-UT-613

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1971  
COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$14,800,000

ACKNOWLEDGMENT: UMTA

## 03 138539

### ADVANCED SUBSYSTEMS DEVELOPMENT PROGRAM (ASDP)

The objective of this investigation, a part of the Urban Rapid Rail Vehicle Systems Program, is to achieve transit vehicles that are as reliable, safe and economical as possible, choosing subsystems which reduce the cost of operation and maintenance, reduce energy requirements and/or improve safety, comfort and performance. The components chosen for detailed development are the self-synchronous a-c traction motor, the monomotor truck with active suspension and the synchronous spin-slide control braking system with improved emergency stopping capability.

Subcontractors are Delco Electronics, Budd Company and Westinghouse Air Brake Division.

PERFORMING AGENCY: Boeing Vertol Company

INVESTIGATOR: O'Brien, T

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1976  
COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$8,650,000

ACKNOWLEDGMENT: UMTA

## 03 138559

### VEHICLE INSPECTION

Provides surveillance and non-destructive inspection of both vehicle and components. Directs and monitors government and contractor development

and evaluation efforts in the areas of automated vehicle on-board surveillance, wayside inspection, and non-destructive inspection of components. Provides for the design and fabrication of transducer, computerized data collection and automated detection systems.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976

ACKNOWLEDGMENT: FRA

### 03 138565

#### ROLLING STOCK SAFETY

The goal of the Rolling Stock Safety Program is to improve railroad safety through the development of (a) performance criteria for vehicles and vehicle components which are less prone to failures, (b) techniques and mechanics for predicting, detecting, and reacting to the failures which do occur, and (c) concepts to increase the accident survivability of vehicle occupants. Work is being undertaken concerning locomotives, hazardous material tank cars, component failure prevention, and track-train dynamics.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1976

ACKNOWLEDGMENT: FRA

### 03 138796

#### RADIAL-AXLE FREIGHT CAR TRUCKS

Agreement with South African Inventions Development Corp. covers application of radial-axle freight car trucks in North America based on Scheffel principles originated on South African Railways. Special wheel tread profile and diagonal bracing between axles minimize flange guidance in curves. Reductions in truck hunting, and wheel and rail wear, and rolling resistance in curves are major objectives.

#### REFERENCES:

Self-Steering Wheelsets Will Reduce Wear and Permit Higher Speeds., Scheffel, H, Railway Gazette International, Vol. 132 No. 12, 453-456 pp, Dec. 1976

PERFORMING AGENCY: Standard Car Truck Company, Proj. No. 30000

INVESTIGATOR: Bullock, RL Tel (312) 427-1466

SPONSORING AGENCY: Standard Car Truck Company

In-House

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Oct. 1973 COMPLETION DATE: Dec. 1977

### 03 138797

#### RADIAL-AXLE PASSENGER CAR TRUCKS

Agreement with South African Inventions Development Corp. covers development and prototype testing in North America of radial-axle trucks for main-line passenger, commuter and transit cars based on Scheffel principles organized on South African Railways. Objectives include improved running stability and riding comfort, and decreased wheel and rail wear.

See also 03A 138796.

PERFORMING AGENCY: General Steel Industries, Incorporated

INVESTIGATOR: Jackson, KL

SPONSORING AGENCY: General Steel Industries, Incorporated

STATUS: Active NOTICE DATE: Aug. 1976 START DATE: July 1976

### 03 148336

#### HOPPER-BOTTOM BOXCAR FOR RAILROAD TRANSPORTATION

Evaluate in the railroad operating and in the physical distribution system environments for bulk agricultural and various types of packaged agricultural and non-agricultural products two prototype hopper-bottom boxcars as a potential method for reducing the seasonal car shortages and costs of transporting grains and soybeans. Two prototype hopper-bottom boxcars will be placed in shuttle service on the Milwaukee Railroad. The service

environments designed to exploit their potential will be determined by computer analysis of traffic flow patterns on the railroad. Revenue ton miles of both bulk and packaged shipments in relation to total car mileage and total car days will be determined for the prototype and for conventional box and covered-hopper cars transporting the same quantities of the same products. The performance levels and engineering design characteristics of both prototypes will be evaluated. Costs, advantages, and disadvantages of using the cars will be determined. Engineering design parameters for improving the cars and their performance will be developed. Cooperative Agreement No. 12-14-1001-951, under which this research will be done, was developed and signed early in the reporting period. Arrangements for the leasing of the two prototype hopper-bottom boxcars by the Milwaukee Railroad were subsequently completed with the British Columbia Railway, and arrangements were made with the U.S. Customs Service to bring the cars into the United States duty-free for evaluation. Applicable railroad freight tariffs were amended to permit shippers to use the experimental cars in lieu of regular equipment. A survey by the railroad identified potential cooperating shippers and receivers and specific freight traffic movements in which the cars could be evaluated were pin-pointed. Arrangements for cleaning, repair, and repainting of the cars in preparation for shipping experiments were made and specific plans for the evaluation were developed.

PERFORMING AGENCY: Chicago, Milwaukee, St. Paul and Pacific Railroad INVESTIGATOR: Porter, EA

SPONSORING AGENCY: Agricultural Research Service, Department of Agriculture; Chicago, Milwaukee, St. Paul and Pacific Railroad

RESPONSIBLE INDIVIDUAL: Breakiron, PL

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976 COMPLETION DATE: 1978 TOTAL FUNDS: \$60,000

ACKNOWLEDGMENT: Department of Agriculture, Current Research Information Service (CRIS-0043369)

### 03 148345

#### RAILROAD TANK SAFETY RESEARCH AND TEST PROJECT. PHASE 16-TANK CAR WEAR EXPERIMENTS

In the FAST program at the DOT Test Center 18 tank cars will eventually accumulate a total of approximately 160,000 miles. These tank car accelerated Life Tests (ALT) will provide an in-service reliability of both insulation jacket type and sprayed-on-coating-type thermal shields. Phase 16 has been established to cover the various tank car component measurements (wheels, trucks, center plates, brake shoes, etc.) as related to wear.

See also 12A 099425.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312)567-3607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976

ACKNOWLEDGMENT: Association of American Railroads Technical Center

### 03 159630

#### FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 6. UTILIZATION IMPACTS OF FREIGHT CAR DESIGN AND SERVICEABILITY

Evaluate the relationships between serviceability and freight car utilization. Analyze utilization costs associated with car purchase decisions based on initial purchase price alone. Standardization of car design will be investigated. Evaluate the utilization costs related to the rejecting of cars by shippers including the costs and benefits of different strategies to reduce the number of expected bad-order cars. Conduct a study to quantify the benefits of cooperative repair programs by individual railroads.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202) 293-5018

92500

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$92,500

ACKNOWLEDGMENT: AAR

03 159632

**MAINTAINABILITY METHODOLOGY FOR THE EVALUATION OF ALTERNATIVE HIGH SPEED PASSENGER TRAIN TRUCKS**  
This work is for the development of a maintainability model for use on advanced passenger trains capable of at least 125 MPH (200 KPH). Passenger train locomotives and powered and non-powered cars will be considered. The model is to include costs associated with all truck components, such as braking equipment, generators, suspension systems, structural elements and traction motors. Acquisition and utilization of design and maintenance data in an appropriate model to provide a methodology suitable for specifying and evaluating new passenger train trucks is the major thrust of this project. Early in the project, the simulation cost model (SCM) technique was identified as being the most appropriate technique to use. It calculates the cost per unit time needed to operate the component or system under consideration. Sensitivity analyses can be run and future cost and component or system usage projections can be made. Since the technique incorporates dynamic analysis, the effects of gradually introducing a new or improved component can be estimated. A Final Report is in preparation.

PERFORMING AGENCY: Shaker Research Corporation  
INVESTIGATOR: Krauter, AI Tel (518)877-8581  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (614)494-2046

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1976 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$70,806

ACKNOWLEDGMENT: TSC

03 159633

## **FABRICATE AND PACKAGE AN ENGINEERING PROTOTYPE NONDESTRUCTIVE RAILROAD ROLLER BEARING DIAGNOSTIC SYSTEM**

The purpose of this contract is to develop a nondestructive instrumentation system for evaluation. This system, a Railroad Roller Bearing Shock Emission Analyzer, will be used as a diagnostic tool to detect spalling and brinelling on roller bearings while mounted on wheelsets. Work on a Pulse Echo Ultrasonic Lubrication Detector has been discontinued due to technical problems and the development of No Field Lubrication (NFL) roller bearings.

PERFORMING AGENCY: SKF Industries, Incorporated  
INVESTIGATOR: Allen, G Tel (215) 265-1900  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (617) 494-2046

Contract DOT-TSC-1377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 TOTAL FUNDS: \$161,643

ACKNOWLEDGMENT: TSC

03 160405

## **IMPROVED PASSENGER EQUIPMENT EVALUATION PROGRAM**

The objectives of this program are to evaluate new passenger train systems and equipment now under development throughout the world, to develop standard methods and techniques for the evaluation of passenger train equipment, and to develop specifications for passenger train equipment.

### **REFERENCES:**

Improved Passenger Equipment Evaluation Program Technology Review. Semiannual Report, Dow, AL, Unified Industries, Inc.; Federal Railroad Administration, FRA/ORD-77/74 32 pp, Oct. 1977, PB-277264/8ST

PERFORMING AGENCY: Unified Industries, Incorporated/SBA  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Lampros, AF Tel (202) 426-9564

Contract DOT-FR-74249 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$2,487,428

ACKNOWLEDGMENT: TRAIS

03 165811

## **RAILCAR STANDARDIZATION--PHASE II**

The broad objectives of UMTA's Railcar Standardization program are to reduce or stabilize railcar initial and life cycle costs, reduce maintenance costs, increase fleet availability and permit evolutionary technology im-

provements. The contractor will perform a series of tasks including one requiring the development of a minimum number of car performance and dimensional specifications which collectively bracket future transit industry requirements.

### **REFERENCES:**

Determination of The Optimal Approach to Rail Rapid Transit Car Standardization, Morris, R, Available at NTIS, UMTA-IT-06-0131-76-1 131 pp, 1976, PB-259-363

PERFORMING AGENCY: PB/Decision Group, IT-06-0175

INVESTIGATOR: Morris, RE Tel (703) 827-0227

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090 Rhine, W Tel (202) 426-9545

Contract DOT-UT-70043

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$524,000

ACKNOWLEDGMENT: UMTA

03 170592

## **TRANSIT TRUCK TESTING**

To provide confidence in analytical predictions for future truck designs and analysis of existing truck problems.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, 3122

INVESTIGATOR: Young, J Tel (416) 248-3771 AppaRao, T

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$31,500

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Can

03 170601

## **RAIL CAR STANDARDIZATION, PHASE II**

APTA will provide industry input, advice and consensus to UMTA contractor in their work in developing the standard rapid rail transit car specification.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60004

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: May 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$140,000

ACKNOWLEDGMENT: American Public Transit Association

03 170604

## **URBAN RAPID RAIL VEHICLES AND SYSTEMS PROGRAM PHASE IV**

The Urban Rapid Rail Vehicles & Systems (URRVS) Program includes two parallel efforts. One activity is directed towards completion of the Advanced Concept Train (ACT) and the other activity supports the Advanced Subsystem Development Program (ASDP).

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60060

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: May 1977 COMPLETION DATE: Jan. 1978 TOTAL FUNDS: \$120,000

ACKNOWLEDGMENT: American Public Transit Association

03 170608

## **ENGINEERING DATA FOR CHARACTERIZATION OF RAILWAY ROLLING STOCK AND REPRESENTATIVE LADINGS AND WHEEL PROFILES**

This contract will provide engineering data to characterize the fleet of U.S. railway rolling stock, representative loadings and wheel profiles, for the range of freight, passenger and locomotive vehicles in current use or proposed for use in the near future. This data is intended primarily for use in parametric studies of rail vehicle/track system dynamic interactions, performed under separate contract (DOT-TSC-1302), and may also be useful to freight systems studies. The efforts of the contractor are expected to result in 1-Definition of major generic families of rail cars and locomotives based on

similar configurational features; 2-Definition of truck configurations, couplers and representative loadings for each generic vehicle family; 3-Engineering parameters describing generic families of vehicles, trucks and loadings; 4-Descriptions of representative in-service wheel profiles for each generic vehicle family.

PERFORMING AGENCY: Pullman-Standard Car Manufacturing Company, Champ Carry Technical Center  
 INVESTIGATOR: Johnstone, B  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Di Masi, FP Tel (617) 494-2210

Contract DOT-TSC-1362

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: FRA

### 03 170617

#### PERFORMANCE LIMITS OF RAIL PASSENGER VEHICLES

The objective of this research is to identify the dynamic performance capability of conventional and innovative passenger truck designs. As a part of this objective, the best performance capability of generic optimum passive passenger trucks, employing conventional wheel-sets, will be established so that specific truck designs may be compared against the general optimum design. The research consists of defining, in an engineering sense, the performance boundaries (hunting, curving, derailment, ride quality, wheel-track force levels, etc.) of current and proposed passenger truck configurations. This work will compare the performance of conventional passenger trucks, optimized conventional trucks and new truck designs (e.g. the radial truck), to determine the performance limits of each class of passenger trucks.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Mechanical Engineering  
 INVESTIGATOR: Hedrick, JK Wormley, DN Richardson, HH  
 SPONSORING AGENCY: Department of Transportation, Office of University Research  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70052

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: DOT

### 03 170630

#### WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDISATION

Standardization of wheelsets with assembled journal bearings. Maintenance recommendations. Standardization of axles. Comparison of calculation methods. Comparative study of various types of roller bearings. Study of current flow through roller bearings. Fixation of brake discs on small wheels. Present state; (1) Standardisation of wheelsets with assembled journal bearings: a. Field tests on wheels of 920 mm Ø will be continued up to end of 1977. b. Tests on wheels of 1,000 mm Ø according to B 136/RP 2 have been commenced. c. Studies and tests for wheelsets fitted with small wheels are being carried out. Standardisation of axleshafts and fixation of brake discs on small wheels will also be dealt with here. (2) Establishment of a calculation method applicable to future standard wheelsets and recognised by the Member Administrations. The first interim report B 136/RP 3 was approved on October 1976. A full report B 136/RP 6 will be presented in April 1978. (3) Studies of maintenance methods for wheelsets with assembled axleboxes used by the different Administrations; report B 136/RP 7, October 1978. (4) Study of current flow phenomena. Inquiry results being evaluated; Report in April 1979. (5) Study of standardization of dimensions of roller bearings is being made with an inquiry (April 1978). Five reports have been published to date. Question B136.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973 COMPLETION DATE: 1979

ACKNOWLEDGMENT: UIC

### 03 170638

#### STANDARDISATION OF AIR-CONDITIONING AND HEATING INSTALLATIONS

With the delivery of the Eurofima prototype standard passenger coaches the B 107 Committee has been given an opportunity to study, in conjunction with the B 108 Committee, different air-conditioning systems (single and twin duct systems) installed in virtually identical coaches. Relevant measurements were taken in accordance with a test programme worked out by a joint group of the two Committees B 107 and B 108, the tests being carried out at the Vienna Arsenal Climatic Chambers. The results of these tests are described in the report B 107/RP 4 of October 1975. Further studies concern the interchangeability of given parts of air-conditioning systems and the improvement of the air distribution in the compartments.

Four reports have been published to date. Project B107.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

### 03 170639

#### CONDITIONS WHICH SHOULD BE COMPLIED WITH BY WAGON COMPONENTS FOR 22 T AXLE LOAD

Study concerning the adaptation of the present cars to an axle load raised from 20 to 22 t. Theoretical and tentative analysis of the structural elements of the car liable to affect directly the operational reliability and fatigue strength at increased axle loads. In the spring and summer of 1976, measurements were made on some test wagons at the PKP. In December 1976, a test train was subjected to fatigue tests on the test loop at Velim (in cooperation with the D141 Committee). At the beginning of May, the distance run by the test train was estimated at 20,000 Km (1st series with an axle load of 22 tons).

Question. B142.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976

ACKNOWLEDGMENT: UIC

### 03 170641

#### ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTRE BUFFERS)

Research, comparison and development of elastic systems for current and future traction and shock systems. Devices to protect the load (long-stroke shock absorbing systems, other means); preparation of leaflets for elastic systems and long-stroke shock absorbing systems. Acceptance testing of spring systems. Comparative tests with representative specimens of the five families of elastic systems have been concluded. All the results have been summarised in a report (RP 14). A joint leaflet has been prepared which will also include the special conditions for the friction cone, hydrodynamic compression and hydrostatic compression families of elastomers (from reports B 36/RP 12 and 13). The acceptance procedure for elastic elements has been initiated; the "ring spring types B 412B" (RP 16) and "B 412A" (RP 17) have been accepted; acceptance of types Jarret DC 13, Rheinmetall 129-11U and Sagem 12054 is in progress. Testing of load protecting devices (so far dealt with in reports No. 10, 11 and 15) is still to be completed. A leaflet for long-stroke shock absorbing systems has been prepared (RP 18). A joint UIC/OSJD leaflet is being prepared for an elastic system for passenger coaches (all elastic elements between two coupled coaches). Theoretical calculations are in progress for elastic systems dependent on speed.

Eighteen reports have been published to date. Question B36.

PERFORMING AGENCY: International Union of Railways  
 RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1959

ACKNOWLEDGMENT: UIC

### 03 170643

#### TESTS ON AUTOMATIC COUPLING

Work has continued to perfect the automatic coupler for wagons, chiefly regarding the interchangeability of various sub-assemblies and the design of the operating components. The engineering work on the automatic coupler for wagons has been completed in time. The revised complete set of drawings



for the production of the automatic coupler is available. A rather large number of these couplers are already in use in trains on scheduled services to gather more findings on the wear characteristics and maintenance conditions. In this connection, trains with a total mass of about 5400 tonnes are also being equipped for ore traffic; they were placed in operation early in November 1976. Tests in progress on revenue earning services on the system of various administrations which, in to some extent difficult operating and climatic conditions, are being made with trains of a total mass of up to 5000 tonnes and fitted with couplers of the 1969 type will be continued. Studies covering the final design of the automatic coupler for passenger coaches have been completed. Some details of this coupler vary from that for wagons to do justice to the special conditions of a modern passenger coach; direct coupling with the automatic coupler for wagons in ensured. The first couplers will be supplied during the period ending 1977/beginning 1978. Preliminary tests will then be carried out immediately. The Specialists Committee is taking part in a large number of other studies: devices on the head stocks of wagons, installation drawings and automation questions connected with the automatic coupler.

Twenty reports have been published to date. Question B51.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Lang, M Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968  
ACKNOWLEDGMENT: UIC

## 03 170646

### STANDARDISATION OF PASSENGER CARS

Inquiry report B 106/RP 1 "Design of passenger accommodation" was presented in October 1971. In conformity with the decision of the 79th meeting of the ORE Control Committee in April 1977, application will be made to UIC to include question S 2031 "Permissible stresses on internal and external parts of passenger coaches" in the B 106 programme of work. Setting up a Specialist Committee B106 had been deferred until the bases for producing a program of work have been provided.

One report has been published to date. Question B106.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970  
ACKNOWLEDGMENT: UIC

## 03 170647

### UNIFICATION OF ELECTRICAL EQUIPMENT FOR PASSENGER COACHES

Standardization of given electrical equipment of passenger coaches such as batteries, lighting, switch boards and instrument cabinets, remote control system for lighting and doors. In connection with the air-conditioning test being carried out by the B 107 Committee, the B 108 Committee is testing power supply systems in the same coaches. These tests cover several (380 V three-phase a.c., 50 Hz and 1000 V d.c.) with rotary transformer as well as systems with a static converter. The results of these tests were published in report B 108/RP 3. Further studies will serve to standardise the electrical equipment of passenger coaches, such as relays, safety fuses, lighting, batteries.

Three reports have been published to date. Project B108.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973  
ACKNOWLEDGMENT: UIC

## 03 170654

### MODERN SUSPENSION SYSTEMS FOR TWO-AXLED WAGONS

The Specialists Committee made extensive strength and running tests with several selected solutions for existing suspension designs, which were assessed according to specified criteria and, taking as a basis the results of the studies and the tests, presented in April 1976, a proposal for a vertical type of progressive suspension system for two-axled wagons in service (B 13 4/RP 1). Operating tests concerning these solutions, and also studies regarding the profitability and suitability of this wagon for taking an axleload of 22 t, will be continued with a view to preparing a standard solution proposal. Completion of this work is expected in 1977. In addition, studies with newly developed progressive suspension systems for future two-axled wagons were initiated.

One report issued to date. Project B134.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1975 COMPLETION DATE: 1977

ACKNOWLEDGMENT: UIC

## 03 170658

### NON-POLLUTING SANITARY INSTALLATIONS

In view of the doubts existing among passengers and authorities concerning the hygienic conditions of toilet systems installed in railway coaches (as a result of which several Administrations have already tested new solutions and suggested possible improvements) an examination is being made of the present position and of possible improvements. The differences in purchasing and maintenance costs for different variants of non-polluting toilets have also been established. The inquiry report B 140/RP 1, was approved by the Control Committee in October 1975. In accordance with the suggestions of the report, the rapporteur was asked to continue his work of observing the tests being made by the different administrations and to prepare a new report within two years. The second enquiry report was approved in October 1977. A Specialists Committee which presented its programme of work and Action Sheet to the Control Committee in October 1977 has meanwhile been set up.

Two reports have been published to date. Question B140.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1974  
ACKNOWLEDGMENT: UIC

## 03 170659

### NON-DESTRUCTIVE EXAMINATION PROCEDURES

The E 139 Committee is studying the standardisation of non-destructive examination procedures for the acceptance testing of running gear at the works. It has initiated its studies by ultrasonic tests in the laboratory on axles; the results are now being evaluated; magnetoscopic tests are in progress. Ultrasonic tests on wheel tyres and solid wheels, which had been collected on various railways were made. A Working Group is preparing a list of expressions used in ultrasonic and magnetoscopic examinations. The E 139 Enlarged Committee, with the participation of representatives from 8 suppliers as Invited Specialists, had been set-up and had held its first meeting.

Question E139.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978  
ACKNOWLEDGMENT: UIC

## 03 170665

### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 4-FUTURE SYSTEM STUDIES

This task will evaluate critically future rail systems options, needs and proposed advanced-concept proposals in order to assess their potential for safe, cost-effective operation to provide direction and priorities for developments of the second stage of Phase III. The subtasks: (4.1) Compile a list of present and future test facilities and match these with future TTD requirements; (4.2) Investigate problem areas in current braking systems, including use of pneumatic system simulation models; (4.3) Survey the scope of options for development of hardware systems from a standpoint of future market opportunities and constraints; (4.4) Explore the engineering economics of car size and include the wheel-load/rail-wear relationships; (4.5) Catalog and evaluate currently proposed advanced concepts and development efforts for couplers, brakes, trucks and other components.

PERFORMING AGENCY: Association of American Railroads Technical Center  
INVESTIGATOR: Punwani, SK Tel (312) 567-3601 Martin, WR Tel (202) 293-4045  
SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre  
RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

### 03 172456

#### STANDARDISATION OF WAGONS

Standardization of freight cars (vehicles, subassemblies and parts) is being achieved in accordance with decisions of the Joint Meeting of the 4th/5th Committees of UIC--Operating and Rolling Stock and Motive Power. Test specifications and test programs are being developed. Plans are also made for adaption of operating rolling stock to receive the automatic coupler. Designs of eight types of cars, including three for transporting containers, have been completed with drawings. The ninth and tenth types to be standardized will be complete in 1978, an eleventh in 1979 and work on the 12th type is being undertaken. Standardization of car components is also progressing. To date a welded car truck, a cross gangway and 20-ft ISO container have been completed. Work on two other truck designs is to be concluded in 1978. Preliminary work on car ends and on the mechanical components of the brake system is also proceeding. Test programs are being developed; current attention is directed at leaf springs, fatigue strength of cars and buffing test conditions.

Twenty five reports have been published to date. Project B12. An extended edition of report B12/RP17 has been published.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

### 03 179688

#### IMPROVED AIR DELIVERY SYSTEMS FOR MECHANICALLY REFRIGERATED RAILCARS

Determine feasibility of through-the-load air circulation in railcars, effect of heavier loading on cooling rates and fruit quality. Determine type, size, and location of vent holes in boxes and slipsheets required for improved air circulation in tightly-stacked unitized loads. Stationary tests will be conducted to determine which of three air distribution systems and stacking patterns will give more rapid and uniform cooling of fruit. Paired shipping tests with citrus will then be made from California to eastern markets in

conventional and modified railcars with the experimental systems. Condition of shipping container and product in a solid-stacked, in-register, and conventional pattern will be compared. Refrigeration equipment performance, cooling rates, and condition of product will be monitored in transit and evaluated. Costs of handling equipment, materials, and labor will be obtained to determine potential savings from unitized and palletized handling compared with conventional handling of individual boxes.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-008

INVESTIGATOR: Kindya, WG

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Feb. 1978 COMPLETION DATE: Feb. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0044323)

### 03 179689

#### CONTAINER SYSTEM FOR GRAIN

Develop a concept for a container system for the handling, storage, and transportation of grain. Develop the basic configuration, characteristics, and technique of operation for all major elements of the system including the container, container fabricating equipment, container filler, handling equipment, storage facility, and highway, railroad, and ocean transport vehicles. The end product of this work unit is to be a concept report setting forth working drawings, description of operation, and preliminary projected cost comparison with the present system.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-006

INVESTIGATOR: Guilfoyle, RF, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043920)

04 054561

## ON BOARD ENERGY STORAGE FOR TRANSIT CARS

Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on subway cars. The kinetic energy of the moving car during braking is directed to a motor driven flywheel resulting in storage of the energy by increasing the speed of the flywheel. During acceleration the flywheel energy is released and supplies the majority of power required for acceleration of the car. Performance by computer analysis indicates a potential energy savings of 30%. Verification of performance compared to conventional car will be accomplished by operation on the NYCTA subway lines.

Subcontractor is Garrett AiResearch

### REFERENCES:

Energy Storage Propulsion System for Rapid Transit Cars: System Design and Equipment Description, Raskin, D; Yutko, R, Available at NTIS, UMTA-NY-06-0006-75-1 46 pp, 1975, PB-249063

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0006

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment; Metropolitan Transportation Authority (New York)

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202)426-0090

Contract DOT-UT-550

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1971 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$1,900,000

ACKNOWLEDGMENT: UMTA

04 058270

## ELECTRIFICATION AND ELECTRIC TRACTION

This sub-program is a continuous effort and is concerned with advanced analytical and laboratory studies in electrical propulsion, as well as basic studies for electrification. The work includes power conditioning systems, linear electric motors, power collection, power distribution, and cost analyses.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Raposa, FL Tel 617-494-2031

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

PPA-RR-05

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

04 058280

## POWER AND PROPULSION SYSTEM, TECHNICAL AND SCIENTIFIC SERVICES AND DATA

Task effort is to include: (1) energy charging analysis and charger station requirements for flywheel propulsion systems for various urban vehicles; (2) power conditioner surveys for the linear synchronous motor; (3) cost data and economic analysis of linear electric motor propulsion systems; (4) review of advanced propulsion, power, and train control approaches for improved freight operations; (5) updating of cost data of wayside power supply systems; (6) design analysis, including both magnetic field and circuit modeling of synchronous and asynchronous linear motors; (7) complex computer modeling and analysis of propulsion drive systems.

PERFORMING AGENCY: Kusko (Alexander) Incorporated

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Raposa, FL Tel (617)494-2031

Contract DOT-TSC-965 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1976 TOTAL FUNDS: \$124,000

ACKNOWLEDGMENT: TRAIS (612-0218)

04 059676

## INVERTER POWER SYSTEM FOR METROLINER

To build a static inverter system capable of operating on a Metroliner vehicle which will be used in place of existing motor alternater system in providing auxiliary power. Due to the contract, Model unit will not be designed for under car installation.

PERFORMING AGENCY: Rohr Industries, Incorporated

INVESTIGATOR: Holt, J Tel (714) 575-2207

SPONSORING AGENCY: Transportation Systems Center, R6351

RESPONSIBLE INDIVIDUAL: Wlodyka, RA Tel (617) 494-2143

Contract DOT-TSC-1284 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$393,000

ACKNOWLEDGMENT: TRAIS (R6351)

04 099377

## FLYWHEEL ENERGY STORAGE SWITCHER (FESS) SYSTEM ENGINEERING

There are three phases which cover the system analysis, fabrication, testing and demonstration of a yard switching locomotive incorporating a flywheel energy storage unit. This project will utilize available hardware and existing knowledge to design, fabricate, and test the system. The three phases are, Phase I--System Analysis, Economic Analysis, and Bench Testing, Phase II--Design, Hardware Fabrication, Testing and Phase III--Demonstration.

Further work will depend on the results of Phase I, System analysis and Bench Testing.

PERFORMING AGENCY: Garrett Corporation

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel 202-426-0855

Contract DOT-FR-74247 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$428,000

ACKNOWLEDGMENT: FRA

04 128008

## FLYWHEEL ENERGY STORAGE STUDY, PHASE I. TECHNOLOGY REVIEW AND FEASIBILITY STUDY

The purpose of this project is to conduct a technology review and data acquisition of existing operational flywheel units as well as of flywheel units that are being actively developed. The units to be considered are complete energy storage systems including the flywheel itself, the input/output motor and controls and the ancillary systems such as the vacuum, lubricating, safety and containment systems. The factors of interest are the cost, energy storage properties and efficiencies, size and weight, reliability, safety, etc. This project will further conduct a preliminary assessment of the feasibility and viability of flywheel energy storage in rail transportation using a benefit cost analysis. This will lead into the Phase II study (if feasibility has been established) which will investigate actual flywheel energy storage applications and uses in terms of cost effectiveness, both in on-board and in-station configurations. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication

INVESTIGATOR: Soots, V

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

04 159663

## WAYSIDE ENERGY STORAGE SYSTEM (WESS)

Feasibility study assessing energy storage concepts for wayside application on long downgrades in railroad freight operations. Technical/engineering economic assessment will include location sites, integrated system concepts or flywheel stations and locomotives, power and energy requirements, locomotive modifications, wayside third rail and/or catenary, flywheel station hardware concepts, control system analysis, energy supplement concepts, interface with electrified railroads, economic viability and cost sensitivity, and recommendations for suitable follow-on work.

PERFORMING AGENCY: AiResearch Manufacturing Company

INVESTIGATOR: Lawson, J Tel (213)323-9500 Shapiro, H

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202)426-0808

Contract DOT-TSC-1349

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: July 1978 TOTAL FUNDS: \$190,000

ACKNOWLEDGMENT: FRA

**04 170637****TRANSMISSION OF INFORMATION THROUGH A TRAIN-LINE**

This study concerns the definition, selection and development of a system for the transmission, first through the UIC loudspeaker cable and subsequently through the automatic coupler, of information which should serve to assist the subsequent automation within the train. Specifications for the transmission system are currently being prepared. These specifications which take into account the results of test runs on the systems of DB, FS, PKP and SNCF will enable recommendations for the choice of a system to be drawn up.

Four reports have been published to date. Question A103.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1967

ACKNOWLEDGMENT: UIC

**04 170640****ACCEPTANCE TESTING AND MAINTENANCE OF DIESEL ENGINES**

Report No. 21, defining the methods for measuring atmospheric pollution by diesel engine exhaust gases, was approved by the Control Committee in April 1977. The next and last report, which fixes the pollution limits for engines in service and for engines still to be built, will be terminated before the end of 1977 and the Committee will be transformed into a Group responsible for the acceptance testing of engines and will merely meet for the purpose of examining test records.

Twenty one reports have been published to date. Question B13

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: 1962

ACKNOWLEDGMENT: UIC

**04 179335****ASSESSMENT OF THE PROSPECTS FOR A NEW ENGINE FOR PASSENGER AND FREIGHT RAIL SYSTEMS**

Evaluate propulsion for railroads and advise FRA on integration of propulsion R&D with related programs in other government agencies and with industry. Tasks include literature survey of prime movers which have potential for replacing the diesel engine for locomotive propulsion; development of FRA R&D plan for replacement of diesel locomotives with locomotives not requiring petroleum fuel; analysis of plans to study and/or develop prime movers to meet needs of the railroad industry; recommendations for an overall FRA plan in this field.

PERFORMING AGENCY: Spriggs, (JO)

INVESTIGATOR: Spriggs, JO Tel (301) 946-3527

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Kamalian, N Tel (202) 426-9564

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1979

05 081802

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH  
PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK  
6--BRAKE SYSTEM**

Task objective is evaluation of the performance of present braking systems to identify those areas where improvements would result from the establishment of performance specifications and/or design guidelines. Evaluation will include stopping distance, reaction time, recharge time, wheel tread temperatures, rigging efficiency, etc. Evaluation will include parametric sensitivity study utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. If desirable, field testing of modified braking systems will be conducted. Task will also include field testing of effects on stopping performance caused by different brake shoes. These tests will be single car "breakaway" tests and will be augmented to full train characteristics using the dynamic simulation computer models.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Misner, GR Tel (312) 567-3587

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

05 148340

**STUDY OF ADVANCED PASSENGER TRAIN BRAKING  
SYSTEMS**

Purpose is to assess the functional performance and economics of various concepts for electromagnetic braking systems for use on locomotives, powered coaches, and non-powered coaches in passenger train operations. The assessment is to be carried out on all such systems in use or proposed regardless of the degree of development to actual hardware. Emphasis of the study will be upon those braking systems which utilize eddy-current effects for the braking force. A comparison study will also be made of braking systems in common use.

PERFORMING AGENCY: Kearney (AT) and Company, Incorporated

INVESTIGATOR: Eshelman, L Tel (215) 594-1746

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Hazel, M Tel (617) 494-2651

Contract DOT-TSC-1298

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$44,900

ACKNOWLEDGMENT: TSC

05 157901

**BRAKING AND COUPLING SYSTEMS PERFORMANCE  
OPTIMIZATION PROGRAM**

This multi-year program will begin in FY-78 with the award of two one-year contracts as follow-on investigations to the technology assessments performed previously. Topics being considered are: the effects of friction shoe materials on wheel profile; control of train action forces through optimization of train line valving and plumbing; electropneumatic braking; configuration economics; load sensing devices; and automatic coupler design.

Contracts to specific performing agencies not yet awarded.

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Fay, GR Federal Railroad Administration Tel (202)426-0855

STATUS: Proposed NOTICE DATE: July 1977 COMPLETION DATE: Dec. 1978

ACKNOWLEDGMENT: FRA

05 159634

**DESIGN AND FABRICATION OF A WAYSIDE BRAKE  
INSPECTION SYSTEM FOR RAILROAD VEHICLES**

This contract is for the development of a brake inspection system. It is expected that the system will be able to determine the braking performance of freight cars in a dynamic mode as a train passes through the wayside system. Two techniques are to be integrated into the total system. Infrared measurement of the energy dissipated by the wheels. The second technique will use a short instrumented "reaction rail" section spliced into one rail to give a quantitative indication of the retarding force of the wheels.

PERFORMING AGENCY: Novatek Incorporated

INVESTIGATOR: Spaulding, D Tel (617)272-6230

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (617)494-2046

Contract DOT-TSC-1323

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$77,753

ACKNOWLEDGMENT: TSC

05 170652

**BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE  
BLOCKS**

Report No. 1 contains the provisional acceptance conditions for brake pads. Studies concerning the physical and chemical properties of pads have been completed and the results are laid down in RP 2. Further tests should demonstrate the suitability of given test procedures for quality checks and also the correlation with the braking performance. Comparative tests on six different test rigs have been completed, studies concerning the causes of differences in the results are in progress and a report No. 4 will be presented in April 1978. Another enquiry concerning the use of composition brake blocks on all ORE administrations has been evaluated and the contents are laid down in RP 3 (initial enquiry B 64/RP 10). On the basis of reports B 64/RP 10 and B 126/RP 1 the final drafts of two UIC leaflets 541-3 and 541-4 have been worked out in co-operation with the UIC Sub-Committee for Braking. Tests in winter conditions (in the dynamic chamber of the Vienna Arsenal Vehicle Testing Station-MBVA) began in September 1977. Results are being analysed, and decisions on future tests will be taken early in 1978. The revised Action Sheet was approved by the Control Committee in October 1977. The B 126 Committee has been asked to prepare a detailed programme and a supplement to the Action Sheet on the problem of brake power limits.

Three reports have been published to date. Question B126.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

05 170656

**STANDARDISATION OF THE MATERIAL FOR CAST-IRON  
BRAKE BLOCKS**

Programme of work and the Action Sheet were approved by the Control Committee in October 1977. The selected cast-iron brake shoes are currently being supplied and the laboratory tests will be started in December 1977.

Question B146.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1977

ACKNOWLEDGMENT: UIC

06 129714

**OPTICAL ACI INVESTIGATION**

Investigation of different techniques involved in receiving retroreflective light from the color coded label and the associated signal processing will lead to a set of engineering requirements and a set of relevant performance specifications. This effort will define a more optimized system with increased performance especially readability.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Long, LE Tel (617) 494-2234

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel 202-426-0855

Contract PPA-RR-716

STATUS: Active NOTICE DATE: Feb. 1978 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$515,000

ACKNOWLEDGMENT: FRA

06 136338

**COMPUTER APPLICATIONS IN CONTROL OF RAILWAY SYSTEMS**

DESCRIPTION: This project encompasses development activity in the application of computers to the control of main line rail traffic, rail classification yards and high density rail and rapid transit interlockings. The general goals of these efforts are improvement of resource utilization, minimization of delays, and greater rail system throughput. Benefits are reduction in energy consumption and increased attractiveness of rail transport as an alternative to more energy intensive forms of transportation. Classification yard control includes automatic computer control of retarder for precise coupling speeds and the switching network for accurate car routing. Computer based management information systems operate in conjunction with the above for maintenance of rolling stock inventory. Development efforts are aimed at improving yard throughput while maintaining or improving coupling speed accuracy. Main line control projects currently underway emphasize centralization and simplification of dispatching and routing functions. Systems deployed to date utilize computer-aided control with the basic decision processes being performed by operating personnel. Development efforts are directed toward higher levels of automatic control encompassing larger areas of controlled territory to yield increased operating efficiency. High-density rail and rapid transit interlockings are ideal candidates for computer control because of their complexity and frequency of traffic. Computerized route finding is currently used in GRS systems, and systems in development will automatically perform many more of the necessary control functions allowing higher traffic densities to be accommodated.

PERFORMING AGENCY: General Railway Signal Company

INVESTIGATOR: Means, JB

SPONSORING AGENCY: General Railway Signal Company

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (AX 615 1)

06 138529

**TRACK CIRCUIT RESEARCH PROJECT**

The objectives of the Track Circuit Research Project are: 1) to develop a comprehensive file and bibliography on track circuits; 2) to develop analytical and computer models of the track circuit which can be used as research tools; 3) to collect the necessary data in order to validate the track circuit models; 4) to prepare several reports containing the information produced by the project. These reports fall into two separate categories, documentation of the track circuit models and a handbook containing the necessary information to understand track circuits.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Patel, S Tel (312) 567-3618

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1975

ACKNOWLEDGMENT: AAR

06 159655

**CLASSIFICATION YARD ELECTROMAGNETIC COMPATIBILITY COMMUNICATION AND CONTROL STUDY**

The objectives of this study are to identify and evaluate the electromagnetic relationships between various systems (power, control, communication) in

the classification yard and to investigate the impact from electrification on communication and signal equipment and the environment. The results of this evaluation will provide for a more compatible electromagnetic environment. The project will include a literature search, analysis and testing. Recommendations will be made for follow-on research, as appropriate.

**REFERENCES:**

Res Plan EMC Study of the Communications and Control Systems in a Railroad Classification Yard, Electromagnetic Compatibility Analysis Center, FRA/ORD-77/44, July 1977

Railroad Electromagnetic Compatibility, Vol. I Electrification Bibliography, Electromagnetic Compatibility Analysis Center, FRA/ORD-77/77.I, Mar. 1978

PERFORMING AGENCY: Electromagnetic Compatibility Analysis Center

INVESTIGATOR: Safferman, S Tel (301) 267-2224 Speh, PE

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel (202) 426-0855

IA AR74311

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$140,000

ACKNOWLEDGMENT: FRA

06 159656

**RAILROAD CLASSIFICATION YARD TECHNOLOGY: NEW CONCEPTS AND ADVANCED TECHNOLOGY IN FREIGHT CAR SPEED CONTROL**

The objective of this study is to select only the most promising car speed control concepts and technology and recommend them as candidates for yard integration and test demonstration. The most promising concepts and technology are to be selected on the basis of cost effectiveness, technical suitability and likelihood for near term (ten years or less) application in upgraded or new U.S. yards. The project will assess the advances in the state-of-the-art. The project will result in a recommended plan for yard integration and tests of the most promising concepts and advanced technology.

Contract to a performing agency has not yet been awarded.

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel (202)426-0855

STATUS: Proposed NOTICE DATE: Aug. 1977 START DATE: Feb. 1977 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$250,000

ACKNOWLEDGMENT: FRA

06 159657

**RAILROAD CAR PRESENCE DETECTION DEVICES**

The objective of this study is to develop a performance specification for car presence detection devices. The project will assess the function and requirements for the device and evaluate the performance of present day devices. The effort will identify and evaluate causes of device failures and collect reliable data on performance. Engineering cost elements will be identified and an analysis of trade-offs between performance and cost.

Contract to a performing agency has not yet been awarded.

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel (202)426-0855

STATUS: Proposed NOTICE DATE: Aug. 1977 START DATE: Mar. 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$210,000

ACKNOWLEDGMENT: FRA

06 160400

**EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY**

The status of present-day signal/control equipment and technology both in the United States and abroad will be evaluated. The results will be publicized and recommendations made for further developments and fabrication of a prototype system using the most advanced techniques. One goal of the program is to provide a standardized system for use on passenger routes with emphasis on using the best techniques of present day technology as used throughout the world.

PERFORMING AGENCY: STV, Incorporated

SPONSORING AGENCY: Federal Railroad Administration

Contract DOT-FR-773-4236 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$538,294

## ACKNOWLEDGMENT: TRAIS

06 170599

### GUIDED RADAR FOR RAILWAY OBSTACLE DETECTION

A continuing problem in rail safety has been the reliable detection of obstacles on the right-of-way. The objective of the current research is to investigate the effectiveness of guided radar for detecting earthslides, mudslides and small obstacles on a railway. VHF guided radar has been under investigation at Queen's University for about 5 years. All the systems currently under development employ two "leaky" coaxial cables, laid parallel, one of which is excited by rf pulses in the 60-120 MHz region. Some of the pulse energy is leaked outside the transmitting cable, and coupled into the second (receiving) cable, which is monitored by a digital computer. An obstacle appearing near the cables causes the field between the cables to be perturbed, and this perturbation, when handled by hardware and software signal processing techniques, indicates the presence of a "target".

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 1.33.77

INVESTIGATOR: MacKay, NA

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Canadian Transport Commission

RESPONSIBLE INDIVIDUAL: English, GW Tel (613) 547-5777

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: May 1977 TOTAL FUNDS: \$12,153

ACKNOWLEDGMENT: CIGGT

06 170610

### OPTICAL AUTOMATIC CAR IDENTIFICATION

The overall objective of this task is the development of a performance specification for an OACI Scanner System of improved readability, to be achieved following design and test of selected modifications to existing equipment. The project is also intended to assess the possibility for improving the scanner reliability and maintainability with reduced life cycle costs. Specific goals include laboratory demonstration of improved readability, particularly for degraded labels and difficult ambient conditions; preparation of design guidelines for a compact self-calibrating scanner configuration requiring no air conditioning; and identification of maintenance benefits associated with improved system design. Under this task, modified scanner configurations will be demonstrated in the laboratory and will include the general improvements designed in FY '77 plus improved digital label data processing. A microprocessor will be selected to replace the existing label data processor, interfaced with the system, and necessary programming carried out. The end deliverables are performance specifications for a high performance, cost effective OACI scanner and documentation of the technical work leading to the performance specification.

#### REFERENCES:

Optical ACI--A New Look Specification, Wiseman, R; Ingraio, HC; Crack, WF, Oct. 1978

Optical Automatic Car Identification (OACI) Scanner Long, LE, July 1978

PERFORMING AGENCY: Transportation Systems Center, R8313

INVESTIGATOR: Long, LE Tel (617) 494-2234

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Long, LE Tel (617) 494 2234

Contract DOT-RR-816 (78-RR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Nov. 1976 COMPLETION DATE: May 1978 TOTAL FUNDS: \$771,000

ACKNOWLEDGMENT: FRA

06 170628

### TRANSMISSION OF DATA TO 9.6 KBIT/S

The Committee was set up in October 1976. At the request of the UIC Committee "Data processing", the A 145 Specialists Committee was entrusted with the task of carrying out practical investigations concerning data transmission, particularly on international railway transmission circuits at speeds from 4.8 to 9.6 kbit/s for application on the future international data processing (teleprocessing) network. The tests will only concern those modems that are recommended by the CCITT (V 29). It is suggested that the tests on modems should be made at Vienna-Arsenal and the measurements concerning the bit and block-error rates on the circuits proposed. The following circuits are proposed: Paris, Frankfurt, Vienna, Warsaw, Lucerne, Rome. The first three series of measurements have been made on the above

mentioned circuits and the measured values are currently being processed.

Question A145

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976

ACKNOWLEDGMENT: UIC

06 170629

### ADAPTATION OF MARSHALLING YARDS FOR TAKING WAGONS WITH WHEEL BASE OF MORE THAN 14 M

Adaptation of electric installations in classification yards for shunting of cars with wheelbase of adjacent axles of more than 14 m. The first stage consists of a technical analysis and an economic survey of existing solutions. The following stage will consist of the choice of solution(s) for existing yards and/or yards still to be constructed.

Question D147.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170631

### PROPAGATION OF RADIO WAVES

The studies are intended to produce guiding principles and data for planning radio links on railway property, covering stations, lines and tunnels. ORE A 133/RP 1 reviewed the documentation available on radio wave propagation and proposed a classification system for railway terrain. Further to this report, methods for the measurement and test of radio propagation on lines, stations and tunnels were produced and applied to collect a considerable amount of experimental data in a number of Administrations. The first series of measurement for the studies were taken in all of the three principal areas of railway terrain. Further measurements are in progress.

One report has been published to date Question A133.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170635

### APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES

Analysis of possible interference in information transmission installations. Theoretical considerations for different d.c. and a.c. thyristor vehicles and tests. A brief summary of the previous work carried out by the A 122 Committee and of the results obtained have been published in an interim report (A 122/RP 16). It can be said that all important questions relating to tractive vehicles have been cleared up. Basically this also applied to signalling systems. Further studies serve to reveal the disadvantages as regards power collection, determination and definition of interference source characteristics, establishment of sensitivity characteristics of objects subjected to interference, superimposition of multiple source interference and confirmation of methods for calculating induced voltages. Results of investigations into the effects on telecommunication circuits and data transmission due to operating thyristor controlled a.c. tractive units (15 kV 16 2/3 Hz and 25 kV 50 Hz) are given in report A 122/RP 22 of April 1977.

Twenty two reports have been published to date.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

06 170650

### USE OF ELECTRONIC COMPONENTS IN SIGNALLING

The ultimate object of the studies is to determine the types of electronic component which may be used in railway safety systems, also specifying their applications and the conditions in which they may be applied. The present phase of studies in this field has now been completed. A review of the work of this Committee leads to the following results: 1. Description of the working environment for electronics in railway signaling applications



(RP 4 and RP 10). 2. General principles, definitions and methods of calculations applicable to safe electronic systems (RP 1, RP 3, RP 5, RP 6, RP 7). 3. Aids to the design of fail-safe electronic circuits (RP 2, RP 8). 4. Safe electronic systems based on computer technology (RP 9, RP 11, RP 12). Furthermore, a general review of the work of this Committee has been prepared (RP 13) and a problem description concerning the transmission of safety information is being prepared to serve as a basis for future work. It has also been agreed that a colloquium on the subject studied by A 118 will take place in 1980 to report on new developments and recent experience in this field.

Thirteen reports have been published to date. Question A118.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1971

ACKNOWLEDGMENT: UIC

07 049659

**HUMAN FACTORS IN RAILROAD OPERATIONS**

This continues a program of research and consultation on human factors in railroad safety in support of FRA regulatory responsibilities involving human performance. Current work includes measurement of air contaminants in the train crew environment, development and evaluation of train handling aids, studies of crew alertness, design of a locomotive cab based on functional requirements, and study of employee motivation.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

INVESTIGATOR: Devoe, DB

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

07 148352

**ALCOHOL AND DRUG ABUSE PROGRAMS IN THE RAIL INDUSTRY: PHASE II**

To develop techniques and program factors that can be used in the development and improvement of alcohol and drug abuse programs. Included in this development will be the verification cost effective measures, and of program effectiveness evaluation techniques. The end goal is to provide information necessary for every railroad to voluntarily develop an alcohol and drug rehabilitation program that will meet its own organizational objectives and needs.

PERFORMING AGENCY: University Research Corporation

INVESTIGATOR: Mannelo, T Tel (301) 524-3936

SPONSORING AGENCY: Federal Railroad Administration; Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: Jan. 1979

ACKNOWLEDGMENT: FRA

07 160247

**IDLER CAB CONCEPT**

The contractor will review the current literature (U.S. and foreign) and research which specifically addresses locomotive and crew work functions, human factor interactions and crew work environment, the monitoring instrumentation used in various cabs and the actuators used to control the locomotive.

PERFORMING AGENCY: Trans System Corporation/SBA

INVESTIGATOR: Woo, JC

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

Contract DOT-FR-74287 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Mar. 1977 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$87,220

ACKNOWLEDGMENT: TRAI

07 170590

**CONFERENCES ON RAILROAD PERSONNEL DEVELOPMENT/ASSISTANCE**

Co-sponsor conferences which familiarize railroad labor and management officials with FRA research activities. Topics of these conferences include but are not limited to alcohol and drug rehabilitation research, training and labor-management communications improvement.

Summaries and/or proceedings available on request.

**REFERENCES:**

Conference on the Detection, Prevention, and Rehab of the Prob Drinker Employee in the RR Industr, Cornell U, Jan 1976, Proceedings 1975

Employee Assistance--An Alternative to Tragedy, Texas Transportation Institute, November 1976, Proceedings 1976

Local Level Labor-Management Workshop (Carson Inn Project) Chicago, Milwaukee, St Paul & Pacific Railroad, Nov. 1976

Conference on Public Support for Railroad Training Stewart (DA) and Associates, Jan. 1978

SPONSORING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

RESPONSIBLE INDIVIDUAL: Vass, TJ Tel (202) 472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1975

ACKNOWLEDGMENT: FRA

07 170598

**A STUDY OF HUMAN FACTORS ASPECTS IN LOCOMOTIVE CAB DESIGN**

The purpose of this study is to make recommendations and to specify further research needs with respect to locomotive cab design with a view to maximizing crew job satisfaction, crew safety and work efficiency.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 7.65.76

INVESTIGATOR: Wilde, GJS Tel (613) 547-6219

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Kiger, SM Tel (312) 567-3614

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: CIGGT

07 170614

**PROPOSED RESEARCH PLAN TO IMPROVE RAILROAD EMPLOYEE TRAINING**

The purpose of this study was to present an overall research plan for consideration by the Federal Railroad Administration which would aid the railroad industry in fulfilling its employee training needs. A sample of eight railroads, including both rail labor and management representatives, were interviewed to determine the extent of existing training and to gain insights as to a possible role for the Federal Railroad Administration. The major recommendation was that FRA consider the development of a Basic Core Curriculum which would have universal applicability over the railroad system. This recommendation and the thirteen other research recommendations are now under review and consideration.

PERFORMING AGENCY: Stewart (D.A.) and Associates, Incorporated

SPONSORING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

RESPONSIBLE INDIVIDUAL: Vass, TJ Tel (202) 472-7280

Contract DOT-FR-75145

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Dec. 1976 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$59,340

ACKNOWLEDGMENT: FRA

07 170662

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 1--TTD TECHNOLOGY SHARING AND IMPLEMENTATION**

This task will develop effective education and training program aids to facilitate dissemination to operating levels of what is known now as a result of the TTD research program. The subtasks: (1.1) Promote safer train make-up through improvement in the knowledge of yardmasters, locomotive engineers and other operating personnel; (1.2) Improve safety awareness of maintenance-of-way and maintenance-of-equipment of conditions of track and equipment that affect derailment tendency and catastrophic failure; (1.3) Tell the TTD story through a newsletter to the rail and supply industry, the government and educational community; (1.4) Develop workshops to coordinate and support the technology transfer of the TTD program; (1.5) Plan, organize and promote a TTD conference to involve the general research community, railroads, suppliers, government and universities.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zotti, RF Tel (312) 567-3585

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

08 049658

**RAIL SAFETY/GRADE CROSSINGS PROTECTION**

The program will consist of three major tasks: (1) Development of Application Guidelines for Train 'on board' conspicuity and impact attenuation devices. (2) Innovative System development will study new grade crossing protection concepts. (3) System Analysis will establish inter-administration state and railroad requirements for a data system to accommodate new FRA grade crossing inventory and other data.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

INVESTIGATOR: Hopkins, JB Tel (617)494-2023

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel 202-426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

08 058459

**ON-BOARD LOCOMOTIVE/AUTO IMPACT TEST DEVICE**

Develop a locomotive/auto impact test device to be evaluated in train-strikes-vehicle validation tests at the DOT High Speed Ground Test Site at Pueblo, Colorado. The development is part of TSC Grade Crossing Safety Research and Development sponsored by the Federal Railroad Administration, Office of RD&D, and is directed toward possible improvement in protection for automobile occupants during grade crossing accidents. The attenuator is also intended to decrease the possibility of train derailment due to automobile engine block entrapment under the locomotive.

PERFORMING AGENCY: Minicars, Incorporated

SPONSORING AGENCY: Transportation Systems Center, RR-502

RESPONSIBLE INDIVIDUAL: Tong, P Tel (617) 494-2539

Contract DOT-TSC-997 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$122,180

ACKNOWLEDGMENT: TRAI (RR-502), FRA

08 148325

**AN EVALUATION OF THE EFFECTIVENESS OF VARIOUS GRADE CROSSING ILLUMINATION STRATEGIES**

The purpose of this research is to determine whether there is a lighting problem at railway/highway grade crossings to which various illumination strategies can be feasible, cost effective solutions. Research that has thus far been directed toward the resolution of the grade crossing problem has been almost exclusively "accident record" based. To this end little is known regarding driver reaction to different grade crossing systems or even to the same systems under varying conditions. More specifically, the research shall:

Determine if illumination at grade crossings improves safety, Evaluate the effectiveness of illumination in a range of crossing conditions, Determine the guidelines for the conditions where illumination is most effective, Determine guidelines that optimize the use of illumination to achieve either maximum improvement at reasonable cost or An acceptable level of illumination with minimum cost and/or energy use. Initial efforts shall focus on analyzing the available data regarding illumination at grade crossings that have had a high-accident rate. Scate models, and visual simulators will be used to evaluate the effectiveness of increased illumination.

PERFORMING AGENCY: Kansas State University, Department of Civil Engineering

INVESTIGATOR: Russell, ER Tel (913) 539-9422

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: MacKinnon, JH

Contract DOT-OS-60133

STATUS: Completed NOTICE DATE: May 1978 START DATE: July 1976 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: \$70,303

ACKNOWLEDGMENT: DOT

08 159644

**COMPUTER SIMULATION OF DERAILMENT IN RAILWAY GRADE CROSSING COLLISION (ENDEV)**

Development of a digital computer program to analyze the collision of road and rail vehicles at grade crossings and a sensitivity analysis of the effect on rail vehicle derailment by several variables.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.35.77

INVESTIGATOR: Churchas, D

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: English, GW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$80,725

ACKNOWLEDGMENT: Queen's University, Canada

08 159654

**GRADE CROSSING SAFETY**

Development of reliable and intelligent train detection, constant warning time devices, off-track train detection and warning devices, and active advance warning signals.

PERFORMING AGENCY: Federal Railroad Administration

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1977 TOTAL FUNDS: \$800,000

09 058267

**METALLURGICAL TESTS AND ANALYSIS FOR HAZARDOUS MATERIAL RAILROAD TANK CARS**

The objectives of this task are to (a) collect a data base on railroad tank car and pressure vessel steels, (b) prepare guidelines for steels to be used in railroad tank car construction, (c) evaluate the elevated temperature performance characteristics of TC-128 steel, and (d) perform a metallurgical evaluation of full scale tanks tested at White Sands Missile Range and tanks involved in actual rail accidents.

PERFORMING AGENCY: National Bureau of Standards, Institute for Materials, Metallurgy Division

INVESTIGATOR: Interrante, CG Tel 301-921-2997

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202)426-1227

AR-40008

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1973 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: FRA

09 059688

**TRANSFORMER COOLANT REPLACEMENT FOR POLYCHLORINATED BIPHENYLS**

The objective is to evaluate a potential replacement material for the Polychlorinated Biphenyls (PCBs) coolant presently used in transformers by the railroad industry. The replacement fluid shall function as a coolant for new railroad transformers as well as a replacement for the PCBs in the transformers already in railroad service.

Final report to be submitted.

PERFORMING AGENCY: General Electric Company

SPONSORING AGENCY: Transportation Systems Center, R6351

Contract DOT-TSC-1293 (CPFF)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 TOTAL FUNDS: \$74,092

ACKNOWLEDGMENT: TRAIS (R6351)

09 059690

**TRANSFORMER COOLANT REPLACEMENT FOR POLYCHLORINATED BIPHENYLS (PCBS)**

The objective is to evaluate a potential replacement material for the Polychlorinated Biphenyls coolant presently used in transformers by the railroad industry. The replacement fluid shall function as a coolant for new railroad transformers as well as a replacement for the PCBs in the transformers already in railroad service.

Final Report to be released.

PERFORMING AGENCY: Westinghouse Electric Corporation

SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-1294 (CR)

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 TOTAL FUNDS: \$99,938

ACKNOWLEDGMENT: TRAIS

09 104358

**FIBER REINFORCED CONCRETE**

Economical, sophisticated, mix designs involving different cementitious materials and properties are being developed for steel fiber reinforced concrete. Fracture characteristics are being studied for concretes reinforced with different fibers. /SIE/

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering

INVESTIGATOR: Kesler, CE

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1972 COMPLETION DATE: 1978

ACKNOWLEDGMENT: Science Information Exchange (NIL 753 4), Illinois University, Urbana

09 135139

**SUPER ELASTIC ALLOYS TO SHOCK ABSORBER SYSTEMS**

The objective of the program is to study the application of 'super elastic' alloys such as aluminum bronze to shock absorber systems such as gun

mounts or vehicle bumpers. The ability of the material to deform considerably (18 to 20 percent), absorb energy of impact, and return to its original configuration after force of impact is removed, lends itself very well to this type of application. The material absorbs mechanical energy in two stages-by martensitic transformation and by elastic deformation. Either or both modes may be used for deformation energy absorption. These alloys function at any useful temperature, and hence would fill all requirements between say, minus 50 degrees C and 100 degrees C. Specifically, it is proposed to investigate this material in configurations where it will augment or replace overtaxed hydraulic systems in gun mounts. This is not overlooking the possible use of this material in the same configurations in vehicle bumpers or for that matter in any application where impact energy must be absorbed. The effect of temperature and loading rate and the configuration for energy absorption by buckling (long and short columns) as well as compressive blocks will be investigated. Also the fatigue characteristics will be looked into.

PERFORMING AGENCY: Department of the Army, Materials and Mechanics Research Center

INVESTIGATOR: Warnas, A Shepard, LA

SPONSORING AGENCY: Department of the Army, Department of Defense, DA0F4717

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZQA 64717)

09 135495

**EVALUATION OF SHOTCRETE THEORY AND TECHNIQUES**

Purpose of study/investigation: To evaluate shotcrete as a construction material for application to Corps project, i.e., to determine correct sampling techniques, pertinent physical properties, problem areas, and limitations of usage. Approach or plan: A summary of what is known about (1) shotcrete from various users, (2) available equipment, and (3) laboratory tests will be made. Both fine and coarse aggregate mixtures will be utilized using the two types of shotcreting equipment (wet and dry). Basic properties, procedures, limitation, and applications will be studied. Progress to date: (1) To date. Laboratory work, approximately 80 percent complete, has been conducted on four types of shotcrete: fine and coarse dry process and fine and coarse wet process shotcrete. Information has been developed on the compressive, tensile, and shear strength of each type of shotcrete. In addition, data have been secured on bond of old shotcrete to fresh shotcrete, permeability and freeze-thaw resistance, and bond to reinforcing steel. (2) Anticipated FY '74. The remaining data on tests mentioned above will be secured, tabulated, and analyzed. The field application phase will be planned and initiated.

PERFORMING AGENCY: Waterways Experiment Station, Concrete Laboratory

INVESTIGATOR: Mather, B

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1973

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 367)

09 136093

**PROTECTION OF WOOD IN USE**

OBJECTIVE: Modify existing procedures and develop new ones for imparting a high resistance to wood against biological degradation and harmful weathering action, with special attention to minimizing objectionable environmental side effects. APPROACH: Develop new concepts and procedures for preserving wood such as chemical modification of the polysaccharides in wood. Investigate the possibility of increasing the permeability of wood by chemical or microbiological methods. Develop an economical preservative treatment for wood piles to protect against all species of borers by a combination of creosote and inorganic salts. Determine the practicality of diffusion-type treatments for various wood species by studying the effectiveness of various combinations of salts and pretreating steps. Develop improved water-repellent-preservative finishes by increasing the permanence of fungicidal chemicals used in such finishes. Improve the permanence of coatings by modifying the surface of wood as an acceptor of finishes. Develop effective preservatives for controlling degradation of pulp chips during outside storage.

REFERENCES:

Nonconventional Wood Preservation Methods Rowell, RM, ACS Symposium Series 43(4): 47-56, 1977

Characterization of the Attack on Wood by the Marine Borer Limnoria

Tripunctata, Kalnins, MA, Amer. Wood-Preserver's Assoc. Proc. 72: 250-262, 1976

Performance of Single- and Dual-Treated Panels in a Semi-Tropical Harbor, Johnson, BR, Amer. Wood-Preserver's Assoc. Proc., 1977

PERFORMING AGENCY: Wisconsin University, Madison, Forest Products Laboratory

INVESTIGATOR: Hajny, GJ

SPONSORING AGENCY: Forest Products Laboratory, 0040038 FPL3212

RESPONSIBLE INDIVIDUAL: Youngs, RL

In-House

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1974 COMPLETION DATE: 1978

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GY 40038 2), Forest Products Laboratory

#### 09 138557

#### IMPROVED INSPECTION, DETECTION AND TESTING RESEARCH

This Division will plan, implement, sponsor and provide overall technical control and direction to development programs in the area of improved inspection, detection and testing techniques and equipment designed to improve railroad safety. The Division is the FRA contact point for all such programs and will provide for interchange of technological information among interested parties within the department, other government agencies and industry. Programs include Safety Life-Cycle Testing, Vehicle Inspection, Track Inspection and Testing, and Automated Inspection System Development.

For the subprograms see RRIS Nos. 03A 138558, 03A 138559, 01A 138560 and 01A 138561.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202)426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

#### 09 138558

#### SAFETY LIFE-CYCLE TESTING

Develops, recommends, promotes and implements, a safety life-cycle testing and evaluation program. Provides facilities, equipment and technology necessary to detect and evaluate the cause and effect of rolling stock and track deterioration/failure thru the accumulation of Life-Cycle testing, data and experience.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977

ACKNOWLEDGMENT: FRA

#### 09 139164

#### RAIL MATERIAL FAILURE PROPERTIES AND BEHAVIOR CHARACTERIZATION

This program is structured along three lines--experiments, analysis and metallography. The crack growth properties of U.S. rail population are determined. The importance of metallurgical factors (chemical composition, microstructure and production methods) are assessed. A fractographic reference standard for service failure analysis will be compiled. A failure model for prediction of rail failures, when small flaws are discovered, will be established. The model will be used to evaluate possible metallurgical changes for rail improvement.

PERFORMING AGENCY: Battelle Columbus Laboratories

INVESTIGATOR: Broek, D Tel (614) 424-6424

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Steele, RK Tel (617)494-2457

Contract DOT-TSC-1076

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: June 1975 TOTAL FUNDS: \$395,738

ACKNOWLEDGMENT: FRA

#### 09 148320

#### FLAMMABILITY STUDIES AND TOXICOLOGICAL EVALUATION OF MATERIALS USED IN TRANSPORTATION VEHICLES

The increasing use of plastics and other man-made materials in various vehicular interiors poses new flammability, toxicity, and smoke generation hazards. Various government agencies and manufacturers have been considering the establishment of performance standards for materials used in interior finishes and several new materials have been developed in anticipation of such standards. This research describes a comprehensive approach to the general materials testing problem, leading to the establishment of design criteria and standards which shall result in fire-safe vehicles for the future. A complete study shall be made of the burning characteristics of various interior materials ignited inside simulated enclosures. Test conditions shall be varied to investigate the effects of the following factors: 1) Flammability ratings of the materials as obtained from laboratory tests. 2) Ventilation rates as provided by different size openings into the enclosure. 3) Partitioning of the enclosure by use of a fire barrier curtain. 4) Discharge of toxic gases into the interior space. A comparison of the flame resistant properties offered by different materials will be conducted. Results of the research will be used to propose new flammability test standards and specific recommendations for increasing vehicle-interior fire protection will be offered.

PERFORMING AGENCY: Rice University, Rice Center for Community Design and Research

INVESTIGATOR: Margrave, JL

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Bolger, PH

Contract DOT-OS-60149

STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$175,000

ACKNOWLEDGMENT: DOT

#### 09 170603

#### SMOKELESS CABLE

APTA is providing industry input to UMTA and UMTA's contractor in the determination of representative insulation materials from a wide sampling of manufacturers and the determination of whether any of these can meet criteria which will be established by taking into consideration the fire hazards inherent in transit systems.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-1277

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$24,000

ACKNOWLEDGMENT: American Public Transit Association

#### 09 179341

#### PLASTICITY EFFECTS IN DYNAMIC CRACK PROPAGATION

The main objective of this research program is to analyze rapid crack propagation in solids which exhibit some amount of ductility, principally structural metals, and to assess the effects of plasticity in the parameters used to characterize the fracture process. The particular problem areas to be studied are (a) the effect of material inertia on the size and shape of the crack tip plastic zone, and the distribution of plastic strain, for a steadily-growing crack in an elastic-plastic material under small scale yielding conditions, and (b) the analysis of rapid crack propagation in structural components, particularly cylindrical pressure vessels and pipelines, in cases where crack growth is accompanied by large scale plastic flow, with emphasis on criteria for crack arrest. There are a number of engineering applications in which dynamic crack propagation research is important, such as the prevention (or arrest) of long running fractures in structural components and the interpretation of laboratory data on the fracture characteristics of materials.

PERFORMING AGENCY: Brown University, Graduate School, Engineering

INVESTIGATOR: Freund, LB

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG77-15564

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$25,980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6629)

09 179345

**COMPOSITE MATERIALS COMPRISING  
REACTION-INJECTION-MOLDING COMBINATIONS OF  
CARBON FIBERS AND THERMOSETTING RESINS**

The objective of the research is to establish feasibility of utilizing chemical compositions comprising polyurethanes and polyepoxides, suitable for adaptation to RIM manufacture, in combination with carbon fibers, carbon fiber veil mats, and carbon fiber kevlar mats. It is the further objective of Phase I to define typical physical characteristics of the composites which can be expected to be processable by means of RIM technology. Finally, it is a still further objective of the study of Phase I to define a part suitable in the transportation industry which would serve as a model for the program to be conducted in Phase II of the project. The research consists of a) definition of a rigid polyurethane matrix suitable for use of RIM machines, comprising the selection of a suitable polyether-diphenyl-methane diisocyanate polymer; b) preparation of test composites the above-described fiber products (chopped fibers, mats), and rigid polyurethane or polyepoxide on a laboratory scale with catalyst systems which are known to be operational in RIM equipment; and c) the more promising products resulting from the above machine casting work will be tested. The transportation field, specifically, the automotive vehicle, is receiving considerable attention because of high energy usage. A much lighter-weight vehicle would help solve this and related problems. However, in order to be of use in the automotive industry, these composites must be manufactured by means of high-speed processes. This research will demonstrate the usefulness of RIM techniques. This research is being supported under the NSF Program Solicitation, "Small Business Innovation Applied to National Needs."

PERFORMING AGENCY: Plastics Technology Associates, Incorporated

INVESTIGATOR: Hostettler, F

SPONSORING AGENCY: National Science Foundation, Division of Science Resources Studies, SRS77-19711

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$24,725

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 417)

09 179346

**TECHNOLOGY ASSESSMENT OF ADVANCED COMPOSITE  
MATERIALS**

Advanced composites are relatively expensive high-technology materials that are now used selectively in high-performance applications. Manufacturers of advanced composites are predicting that their costs will decrease significantly over the next few years, so that these materials will be competitive with metals in specific mass market applications. Such continuing cost reductions and an increasing need for high-performance materials in at least two major sectors of the economy, automotive transportation and energy conversion, may result in a period of major growth for the advanced composites industry. If this occurs, a new commodity material industry would emerge with all the concomitant changes and impacts implied. The objective of this work is to develop a framework, through the identification of issues and questions related to the development and use of advanced

composite materials, for carrying out a comprehensive assessment of potential long-term socioeconomic and environmental impacts which would result from the increasing uses of these materials in various sectors of the economy.

PERFORMING AGENCY: Argos Associates Incorporated

INVESTIGATOR: Kaiser, R

SPONSORING AGENCY: National Science Foundation, Division of Exploratory Research and Systems Analysis, ERS77-19647

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$24,969

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 402)

09 179691

**CORRUGATED PACKAGE ENGINEERING**

Determine ways to utilize wood resources more efficiently through improved engineering, design, and converting of both existing and underutilized fibers. Determine what performance criteria are needed in converting linerboard and corrugating medium to corrugated fiberboard as produced from existing and underutilized fibers; determine the most efficient placement of fiber in the corrugated structure; establish the relationships between the performance of the component paperboards, combined board and finished containers; provide improved and new engineering and design information about the physical requirements of packaging materials for their efficient performance in the service environment. Determine that the strength of particleboard is affected by rate of loading and duration of load in much the same way that solid wood and hardboard are affected. Evaluate the effect of moisture content on the engineering properties of structural particleboards made from forest residues. These properties generally were not changed by low humidities but were reduced by high humidity. Engineering properties of Forest Service Structural Flakeboard are being evaluated. A number of laminated particleboard railway crossies have been fabricated from discarded ties and evaluated. Results are promising. This development could solve supply, disposal, and pollution problems. A first draft of a performance standard for packaging was presented to ASTM D-10. The performance of pallets assembled with staples was found to be acceptable. Further confirmation was found that the use of an impact panel on a forklift truck greatly extends pallet life. Pallets using medium density hardboard as deck material were found to give good resistance to forklift impacts. For conventional nailed wood pallets, butting the first and second to deckboards increased resistance to handling impacts. Auxiliary walls to improve the sound insulation between living spaces in existing buildings were evaluated and found to give significant improvement if not limited by flanking paths. An interrelationship between partition, flanking, and field sound-transmission loss was developed to establish empirical flanking limits.

PERFORMING AGENCY: Forest Products Laboratory

INVESTIGATOR: Koning, JW, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1972 COMPLETION DATE: June 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0040039)

10 058132

**PROGRAM FOR LOCOMOTIVE AND MARINE DIESEL ENGINE PERFORMANCE AND EMISSIONS**

To improve engine efficiency and reduce emissions from large medium speed diesels. Methods include the use of waste lube oil, determining ship duty cycle, optionization of prop/pitch loading, development of engine diagnostics, and the use of water-in-fuel emulsions.

## REFERENCES:

A Study of Fuel Economy Emission Reduced Methods for Marine and Locomotive Diesel Engines, Storment, J, Sept. 1975

Waste Oil Burn-off in CG Powerplants Storment, J, July 1976

Use of water-in-fuel-Emulsions in a Single Cylinder Diesel Engine, Storment, J

PERFORMING AGENCY: Southwest Research Institute

INVESTIGATOR: Storment, JO Tel (512)684-5111x2643

SPONSORING AGENCY: Transportation Systems Center, CG-407; United States Coast Guard

RESPONSIBLE INDIVIDUAL: Mason, RL Tel (617)494-2514

Contract DOT-TSC-920

STATUS: Active NOTICE DATE: Jan. 1977 START DATE: Nov. 1974 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: TRAIS (CG-407)

10 058621

**RAILROAD RETARDER NOISE REDUCTION**

A cooperative effort is planned between DOT (TSC), and the BN to collect, assess and disseminate information regarding the character of the noise environment associated with the operation of active retarders in railroad classification (hump) yards and also, to present in useful form information as how to reduce retarder noise locally and to surrounding communities by the use of noise barriers. Information will be obtained by a measurement, barrier construction and evaluation program to be conducted at the Northtown freight classification yard of the Burlington Northern Railroad, Fridley, Minnesota.

PERFORMING AGENCY: Burlington Northern, Incorporated

SPONSORING AGENCY: Transportation Systems Center, OS-507

RESPONSIBLE INDIVIDUAL: Rickley, EJ Tel (617)494-2372

Contract DOT-TSC-1035 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1975 TOTAL FUNDS: \$69,150

ACKNOWLEDGMENT: TRAIS (OS-507), FRA

10 058675

**DEVELOPMENT OF ENGINEERING DATA ON IN-SERVICE PERFORMANCE AND COSTS OF METHODS FOR CONTROL OF URBAN RAIL SYSTEM NOISE**

The objective is (1) to develop definitive engineering data on long term costs and performance of four noise control techniques, and (2) to organize and present the data to permit engineering estimates of costs and performance of the techniques on any urban rail transit system in the United States. The techniques are: (a) use of resilient wheels on transit cars, (b) use of damped wheels, (c) use of wheel truing equipment to remove wheel flats and reduce wheel roughness, and (d) use of rail grinding equipment to reduce rail roughness.

## REFERENCES:

In-Service Performance and Costs of Methods for Control of Urban Rail System Noise. Experimental Design, Holowaty, M; Saurenman, H; Rosen, S, UMTA-MA-06-0025-76-4Intrm Rpt., May 1976

In-Service Performance and Costs of Methods for Control Urban Rail System Noise. Test and Eval Plan, Saurenman, H; Holowaty, M, UMTA-MA-06-0025-7710Intrm Rpt., Apr. 1977

PERFORMING AGENCY: De Leuw, Cather and Company

SPONSORING AGENCY: Transportation Systems Center, UM-804

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$425,357

ACKNOWLEDGMENT: TRAIS (UM-804), TSC

10 138534

**NOISE ABATEMENT**

Identified as a major systems problem for transit authorities, this program has as its objective the reduction of noise and vibration on urban rail transit

systems. Problem areas have been identified and the noise climate on operating authorities has been appraised. Tests and evaluation of available abatement hardware are to be made. New technology is to be developed. A handbook on noise and vibration control is to be produced.

PERFORMING AGENCY: Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract DOT-UM-604

STATUS: Active NOTICE DATE: July 1976 START DATE: 1971 COMPLETION DATE: June 1979 TOTAL FUNDS: \$3,500,000

ACKNOWLEDGMENT: UMTA

10 148341

**WHEEL/RAIL INTERACTION SIMULATOR**

Design of a machine which simulates interaction of rails and wheels for purposes of noise measurements.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication

INVESTIGATOR: Curmi, RA Tel (416)248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication

RESPONSIBLE INDIVIDUAL: Curmi, RA Tel (416)248-3771

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Dec. 1976 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Roads and Transportation Association of Canada

10 148349

**ADDITIONAL RAIL RAPID TRANSIT NOISE STUDIES BASED ON THE NEW YORK CITY TRANSIT AUTHORITY**

This work is a continuation of the work performed by the Polytechnic Institute of New York on "Noise Assessment and Cost of Abatement in the NYCTA Rail Transit System." Three efforts are being undertaken: 1) Cost Data and Analysis work will aim at improved quantification of the costs associated with noise control treatments. 2) Field Measurements of noise in and near selected cars or trackage will quantify rates of degradation of improvements in terms of noise. 3) Analysis of Car Maintenance Records will be used to correlate car status with noise characteristics and to help determine useful life and costs of car improvements, overhaul and time since certain key repairs.

PERFORMING AGENCY: Polytechnic Institute of New York

INVESTIGATOR: McShane, WR Tel (212) 643-5525 Slutsky, S

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

Contract NY-11-0002

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$62,304

ACKNOWLEDGMENT: UMTA

10 170655

**RAILWAY NOISE**

The reference values for the noise and vibration stresses to which people are exposed is established along with the propagation of train running noise and the influence of sound protection barriers and vehicle skirting. Proposals for noise abatement measures for older railway vehicles and the effect of time on the acoustic behaviour of railway vehicles are presented. Noise generation during the wheel/rail rolling contact and when braking and negotiation sharp curves are discussed. A report about noise levels inside and outside the vehicles of various Administrations was approved in the meantime. It takes into account statutory regulations and gives provisional guide values for noise levels. A further report explains radiation and propagation conditions for railway noise in free field on embankments and in cuttings. A detailed work program is being drawn up for dealing with sound variation from bridges. Furthermore, the influence of sound protection barriers and vehicle skirting has been studied. Curve screech and braking noise tests are terminated. The findings have been summarized in a report. An interim report is now available concerning experience with technical noise abatement measures for old vehicles.

Six reports have been published to date. Question C137.

PERFORMING AGENCY: International Union of Railways



RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments  
 STATUS: Active NOTICE DATE: Aug. 1978  
 ACKNOWLEDGMENT: UIC

10 173171

## SOURCE ASSESSMENT-TANK TRUCK, RAIL CAR, AND DRUM CLEANING

The objective is to identify the impact on the environment from the cleaning and reconditioning of tank trucks, rail tank cars and drums. The study will identify the companies involved in the cleaning of tank cars, tank trucks and reconditioning of drums, assess the existing pollution control technology, identify hazardous and potentially hazardous materials emitted, produced or used and identify areas where new or improved technology is required.

PERFORMING AGENCY: Monsanto Research Corporation  
 INVESTIGATOR: Blackwood, T  
 SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development, 68-02-1874 B604B-421

Contract  
 STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$7,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GMA 3683)

10 179325

## TRANSPORTATION NOISE RESEARCH

Transportation noise is the single most intrusive noise as rated by the American public. In an effort to reduce this noise, the U.S. Department of Transportation has recognized that the development of appropriate noise measurement methodologies and their substantiating data bases are a necessity for the development of quieter transportation systems. In order to assist DOT in this area, NBS is conducting in-cab locomotive noise measurements sponsored by the Federal Railroad Administration. The objective of this program is the development of a measurement methodology and instrumentation system for assessing the noise environment in locomotive cabs. The information obtained from this assessment is to be in a form such that the total noise exposure or "dose" of each of the crew members can be determined. In addition, the measurement techniques utilized are to provide a means of identifying individual component sources as well as specific locomotive operations which might contribute to the noise levels in the locomotive cab. As a further extension of this program, the feasibility of developing a stationary measurement methodology which provides

information that can be correlated to the results obtained for in-service operations is to be examined.

### REFERENCES:

Locomotive In-Cab Noise--Towards a Standardized Measurement Methodology, Clark, RM; Kilmer, RD; Blomquist, DS, 77 Nat'l Noise Conf on Transp Noise Control Hampton, Va 7710, Proceedings, 1977

PERFORMING AGENCY: National Bureau of Standards, 7353432

INVESTIGATOR: Kilmer, RD Tel (301) 921-3381

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Clarke, RM Tel (202) 426-1227

Contract IAG-AR-T4269

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: National Bureau of Standards

10 179685

## RAILROAD RIGHT-OF-WAYS AS WILDLIFE HABITATS IN STORY COUNTY, IOWA

Inventory the kinds and numbers of mammals and birds that utilize habitats found along railroad right-of-ways in an intensely farmed region of central Iowa. Associate bird and mammal use with specific right-of-ways habitats. Assess the relative importance of railroad right-of-ways to the total available wildlife habitat in Story County, Iowa. Sampling plots will be selected by a stratified random method and will comprise about 5% of the rural, right-of-ways in Story County, Iowa. The strata will be active Right-of-ways, abandoned right-of-ways, right-of-ways with exceptional native prairie, and right-of-ways adjacent to wetlands. Vegetation in all sampling plots will be covermapped. A census of birds and rabbits will be taken in each season of the year using a plot method known as the bounded count. Small mammal populations will be evaluated by trapping. Other mammal activity will be determined by evaluating "sign". The relative importance of right-of-way habitats will be assessed by comparisons with similar evaluations done on other wildlife habitat in Story County.

PERFORMING AGENCY: Iowa State University, Ames, Department of Animal Ecology, IOW02268

INVESTIGATOR: Klaas, EE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073892)

11 058273

**EVALUATION OF ELECTRICAL PROPULSION BY MEANS OF IRON-CORED SYNCHRONOUSLY OPERATING LINEAR MOTORS**

This project constitutes the initial research phase of synchronous linear motors for transportation. The motors considered are restricted to those having both the excitation and armature windings on the same structure, i.e., on board the vehicle. The primary objectives are to determine the feasibility of two types (the homopolar inductor and the claw-pole) for propulsion of railroad vehicles, and to establish a basis for further exploratory R&D on a test wheel. The aim is to develop an alternate to the present linear induction motor, with the potential for higher efficiency and power factor, larger clearances with the reaction rail, and useful attraction and guidance forces to inhibit vehicle derailment.

PERFORMING AGENCY: Polytechnic Institute of New York

INVESTIGATOR: Levi, E Tel (212) 643-4486

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9564

STATUS: Active NOTICE DATE: Aug. 1977 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: FRA

11 058375

**MORGANTOWN PERSONAL RAPID TRANSIT SYSTEM IMPACT EVALUATION PHASE I**

This study consists of four phases as follows: (1) Pre-PRT phase prior to passenger service of the system, (2) Interim Phase during initial passenger service, (3) Operational Phase following introduction of revenue service, and (4) Final Phase integrating all data about Phase I system. The study objectives include (a) to measure the service and accessibility of the system, (b) to determine the nature of system patronage, (c) to describe the operational costs and revenues of the system, (d) to examine the attitudes toward the systems, (e) to measure the impact of the PRT on travel and traffic, the economy, the society, and the environment in the PRT corridor. The Pre-PRT and Interim Phases have been completed. The Operational Phase is scheduled for completion in August 1978. The Final Report Phase is scheduled for completion in Fall 1978.

PRT Impact Study, Pre-PRT Phase. March 1976, Volume 1- Travel Analysis, SEG Elias; Volume 2-Data Collection Methodology and Coding Manual; Volume 3-Frequency Tabulations from Transportation Related Surveys, CN Redwine. Interim Phase. June 1977, Impact Evaluation of Morgantown PRT 1975-1976 Ridership: Interim Analysis, M.D. Stearns and K.H. Schaeffer.

PERFORMING AGENCY: West Virginia University, WV-03-0006 DOT-TSC-1316

INVESTIGATOR: Elias, SEG Tel (304) 293-5536

SPONSORING AGENCY: Transportation Systems Center, UM-839; Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Stearns, MD Tel (617)494-2796 Rubin, D Tel (617) 494-2160

Contract DOT-TSC-985

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$272,333

ACKNOWLEDGMENT: UMTA, West Virginia University, TSC

11 059365

**ANALYSIS OF THE MORGANTOWN INDUCTIVE COMMUNICATION SYSTEM DESIGN**

Provide a report documenting the Morgantown Inductive Communication System Design. The report shall contain the following elements: a) Provide a general description of the MPRT System and its operation including a description of the Control and Communications System; b) Describe the system level design requirements and the resulting design, analysis and development test program undertaken to meet and validate these requirements as well as the rationale that led to the selection of the communication techniques implemented in the MPRT System; c) Describe the significant analysis and test results obtained, with emphasis on the major problem areas encountered at Morgantown and the solutions to these problems; d) Provide a detailed description of efforts made to develop a guideway analytical model, any validation tests performed and known limitations of work done to date. Define areas which must be expanded or validated to develop a useful guideway model.

PERFORMING AGENCY: Boeing Company, P.O. Box 3999, DOT-TSC-1275

INVESTIGATOR: Johnstone, T Tel (206) 773-1826

SPONSORING AGENCY: Transportation Systems Center, R6782

RESPONSIBLE INDIVIDUAL: Yoh, P Transportation Systems Center Tel (617)494-2271

Contract DOT-TSC-1275 (CPF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$21,525

ACKNOWLEDGMENT: TRAIS (R6782)

11 059380

**SYSTEMS OPERATION STUDIES FOR AUTOMATED GUIDEWAY TRANSIT SYSTEMS**

No Abstract.

PERFORMING AGENCY: General Motors Corporation

SPONSORING AGENCY: Transportation Systems Center, R6709

RESPONSIBLE INDIVIDUAL: Priver, AS Tel (617) 494-2357

Contract DOT-TSC-1200 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$3,384,091

ACKNOWLEDGMENT: TRAIS (R6709)

11 059421

**LINEAR INDUCTION MOTOR RESEARCH VEHICLE (LIMRV) TEST PROGRAM**

The primary object of this test program is to obtain essential test data on linear induction motors and on truck/rail dynamics, as well as correlation of this data with theory and mathematical models. The LIMRV is considered an important testbed because of its unique instrumentation and speed range. The LIMRV has established a world speed record for steel-wheel on steel-rail vehicles of 411.5 Km/h.

PERFORMING AGENCY: AiResearch Manufacturing Company

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202)426-9665

Contract DOT-FR-64226 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Apr. 1976 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$1,210,000

ACKNOWLEDGMENT: TRAIS

11 059435

**ALTERNATIVE GUIDEWAY CROSS SECTION STUDY**

The successful implementation of advanced technology transportation systems-systems more advanced than those currently being investigated in UMTA's Automated Guideway Transit (AGT) program-may well depend on the ability of system designers to develop low cost, elevated, aesthetically pleasing guideways permitting extensive switching and carrying two-way vehicle flow. Possible guideway configurations which meet these criteria include those with an elevated single beam span which can support two-way flow by either suspending the vehicles from the side of the beam or in an over-and-under configuration. What is needed is a rational approach to measure the overall effectiveness of the various guideway possibilities, particularly with regard to structural efficiency and cost.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Wormley, DN

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-9364

ID DOT-AS-70005

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: TRAIS

11 059696

**AGT AVAILABILITY GUIDELINES**

The objective is to develop and examine various definitions and expressions for the service availability of automated guideway transit systems and to develop a set of guidelines that will present the definitions along with their applicability and use.

PERFORMING AGENCY: Battelle Columbus Laboratories

SPONSORING AGENCY: Transportation Systems Center, R6709

RESPONSIBLE INDIVIDUAL: Watt, CW Tel (617) 494-2298

Contract DOT-TSC-1283 (CPF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 TOTAL FUNDS: \$97,366

ACKNOWLEDGMENT: TRAIS (R6709)

11 059922

#### INVESTIGATION OF VEHICLE-SUSPENSION GUIDEWAY DYNAMIC INTERACTIONS FOR URBAN TRANSIT

The project on the investigation of vehicle-suspension guideway dynamic interactions for automated rail transit will be composed of two major tasks: 1) extend previously developed techniques to achieve design programs for multi-vehicle guideway systems. The use of multiple spans is likely to reduce guideway cross-sectional requirements and minimize thermally induced deflections thus reducing guideway costs; 2) conceptually design and evaluate practical limitations for lateral AGT vehicle steering. This work will provide a reference of optimum performance against which to measure the performance of any real steering system, and a series of practical steering systems which could be implemented in practice.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Richardson, HH Tel (617) 253-2222

SPONSORING AGENCY: Urban Mass Transportation Administration, MA-11-0003

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-8483

Grant DOT-MA-11-0003

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1976 COMPLETION DATE: Jan. 1978 TOTAL FUNDS: \$71,450

ACKNOWLEDGMENT: TRAIS (MA-11-0003)

11 059924

#### MULTI-DISCIPLINARY STUDY OF THE USE OF TRAINS OR PLATOONS OF VEHICLES FOR URBAN AUTOMATED GUIDEWAY TRANSPORTATION (AGT)

The project undertakes research on the use of trains or platoons of vehicles in combination with individual small vehicles for urban automated transportation. The multi-disciplined study will undertake two tasks: 1) System Operations-Relate the technological characteristics of the trained AGT systems to the potential economic and service advantages these systems offer. 2) Vehicle Control- Investigate vehicle control configurations. Determine what kind of vehicle control system will permit operations at the highest capacity level. Derive and justify the safety assumptions and synthesize and simulate the controller configuration. Conduct a single-vehicle/train capacity analysis.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Shladover, SE

SPONSORING AGENCY: Urban Mass Transportation Administration, MA-11-0029

RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Grant DOT-MA-11-0029

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$47,000

ACKNOWLEDGMENT: TRAIS (MA-11-0029)

11 130956

#### PIPELINE TRANSPORTATION OF SOLIDS IN SLURRY FORM

Objective: To assist in the development of this technique for the transportation of bulk solids. Approach: (a) To conduct experimental studies of the factors governing energy consumption for typical materials in pipelines up to 12 inches in diameter; (b) to examine new materials or equipment proposed for such pipelines; (c) to study procedures or design changes which could reduce capital costs or improve pipeline reliability; (d) to examine the application of this new technique to new situations. Progress: 1. A thorough study of the pipeline behaviour of Western Canadian metallurgical coals in water: Studies of Manitoba limestone in water, Quebec iron ore in water, Saskatchewan potash in brine, and various sands in water have been completed. 2. A preliminary study of the preparation, pumping, separation and utilization of Western Canadian coal-oil slurries is being completed. 3. Various theoretical studies and research contract investigations for commercial clients are in progress. 4. Current plans include the study of mixtures containing coarse (one inch diameter and above) particles. The major application of such work will be in coal mining. Academic studies relating to these projects are also undertaken.

REFERENCES:

Experimental Studies on Pipelining of Canadian Commodities: Report 1 to 9

Experimental Studies on Pipelining of Coal-Oil Slurries

PERFORMING AGENCY: Saskatchewan University, Canada, Saskatchewan Research Council & Department of Chem & Chem Eng

INVESTIGATOR: Husband, WH Tel (306)343-2952 Haas, DB Shook, CA

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Gilbert, IF Tel (514)283-5071

Contract TDA-OSU76-00165

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1970 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$500,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (SJ 632)

11 135604

#### COMMAND AND CONTROL SYSTEMS FOR ADVANCED TRANSPORTATION SYSTEMS

This project is a study of new "people mover" concepts which may evolve to provide practical attractive alternatives to the private automobile as a mode of transportation. Each concept requires a command and control system not only to provide safety but also to ensure efficient and expeditious movement of traffic. In all cases operation is automatic with respect both to the onboard control of the propulsion and brakes of the individual vehicles and also to the overall coordination of system functions. Development effort has been directed toward meeting new requirements of advanced system concepts. Especially in the area of Personal Rapid Transit, controls are being developed to meet the conflicting need to achieve traditional standards of rapid transit safety while permitting the short headways necessary for acceptable capacity with small vehicles. A family of control systems is being realized for applications varying widely with respect to vehicle characteristics, guideway configuration, and operating policy (scheduled or demand modes of service).

PERFORMING AGENCY: General Railway Signal Company

INVESTIGATOR: Auer, JH

SPONSORING AGENCY: General Railway Signal Company

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (AQ 881 2)

11 138792

#### MORGANTOWN PRT SYSTEM

Develop a personal rapid transit system capable of carrying 5,000 passengers per lane per hour at a 15-second headway, prove the technical feasibility of a fully automated PRT, determine economic and service benefits of a PRT system and assess the institutional problems encountered in building such a system in an urban environment. The concept of automatic control for a vehicle system operating on close headways and the fail-safe concept using checked redundancy have been validated. Design for expansion of the system is underway. Present system is being expanded under an UMTA Capital Grant of \$63.5M to the West Virginia Board of Regents from 3 stations, 5.4 miles single lane guideway, and 45 vehicles to 5 stations, 8.4 miles single lane guideway, and 73 vehicles. An Additional maintenance facility, a heated power rail, and other technical improvements will also be added.

REFERENCES:

Morgantown PRT System Boeing Aerospace Company, Nov. 1975

PRT Impact Study (Pre-PRT Phase) Elias, SEG, Mar. 1976

Morgantown PRT Operation & Maintenance History Stone, AL, Boeing Aerospace Company, Jan. 1977

Morgantown PRT Impact Evaluation. Interim Analysis Of Ridership, Stearns, M; Schaeffer, K, Mar. 1977

PERFORMING AGENCY: Boeing Company; West Virginia University

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Barsony, SA Tel (202) 426-2896

Contract WV-06-0005

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1970 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$60,000,000

ACKNOWLEDGMENT: UMTA

11 138793

#### AUTOMATED GUIDEWAY TRANSIT INDEPENDENT STUDIES

The objectives of this project are to provide technical studies and analyses to support the development of critical technologies under the AGT program.

The entire program was initiated in 1973 but the current phase calls for vehicle/guideway trade-off studies; environmental impact guidelines, functional analysis, and technical studies and analysis to support the automated guideway transit technology program.

PERFORMING AGENCY: Mitre Corporation  
 INVESTIGATOR: Mouchaboir, G Tel (730) 827-6910  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4047

Contract UT-50016

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: June 1975 COMPLETION DATE: May 1978 TOTAL FUNDS: \$460,000

ACKNOWLEDGMENT: UMTA

#### 11 148334

##### NON-CONTACT SUSPENSION/PROPULSION TECHNOLOGIES

An integrated magnetic levitation/propulsion system is a possible candidate for achieving noiseless, lightweight urban and moderate speed interurban transportation. The objective of this research is to explore the feasibility of such systems for high-speed interurban transportation. A single-sided linear induction motor (LIM) and reaction rail will be fabricated and tested on the rotating wheel facility operated by the Canadian Institute of Guided Ground Transport at Queens University in Kingston, Ontario. These tests and subsequent analysis will be used to place SLIM performance in context with competing magnetic levitation schemes.

PERFORMING AGENCY: Mitre Corporation, Metrek Division  
 INVESTIGATOR: Milner, JL Tel (703) 790-6456  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-UT-50016

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$409,362

ACKNOWLEDGMENT: DOT

#### 11 148343

##### DYNAMIC EXPERIMENTS OF ALTERNATIVE GUIDEWAY-VEHICLE SYSTEMS

The purpose of this Project is to experimentally investigate vehicle-elevated guideway response dynamics. The first major objective is to experimentally validate the various analyses of vehicle-guideway dynamics developed within the past several years. The second objective is to experimentally investigate those vehicle-guideway configurations which because of complex geometries, have not yet received analytical treatment.

PERFORMING AGENCY: Duke University  
 INVESTIGATOR: Wilson, JF Tel (919)684-2434  
 SPONSORING AGENCY: Office of the Secretary of Transportation  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-OS-60130

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$111,000

ACKNOWLEDGMENT: DOT

#### 11 148346

##### NON-CONTACT SUSPENSION/PROPULSION TECHNOLOGIES

This is a US/Federal Republic of Germany cooperative research project. The objective is to determine the limits of allowable guideway flexibility and roughness for high-speed attraction magnetic levitation systems. Tests will be conducted using the German-developed 400 K/h KOMET test vehicle and track. The test data will be used to validate vehicle/guideway computer simulations which will be used to perform parametric studies.

PERFORMING AGENCY: Mitre Corporation, Metrek Division  
 INVESTIGATOR: Milner, JL Tel (703)790-6456  
 SPONSORING AGENCY: Office of the Secretary of Transportation; Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-TSC-1263

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: DOT

#### 11 148347

##### ASSESSMENT OF TECHNOLOGY BASE AND APPLIED RESEARCH FOR NON-CONTACTING VEHICLE SUSPENSION AND PROPULSION SYSTEMS

The research shall assess critically the technological base available for the evaluation of non-contacting suspension and propulsion systems in urban and intercity transport systems. The assessment involves critical reviews of existing data, identification of gaps in current technology and areas which show promise for the future. An applied research program to provide performance data for selected ferromagnetic and fluid non-contacting propulsion and suspension systems complements the general assessment.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Hedrick, JK Tel (617)253-2246 Richardson, HH  
 SPONSORING AGENCY: Office of the Secretary of Transportation  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-OS-60135

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$250,000

ACKNOWLEDGMENT: DOT

#### 11 149463

##### SYNCHRONOUSLY OPERATING LINEAR ELECTRIC MOTORS FOR GROUND TRANSPORTATION

To conduct studies, primarily analytical, of certain aspects of linear synchronous motor operation and design. To review work of General Electric, done under a related contract, on the design of linear synchronous motors, and on the construction and testing of a small scale model of such machines.

##### REFERENCES:

Preliminary Method for Design of a Linear Synchronous Motor, Inductor Type, Levi, E, Jan. 1977

PERFORMING AGENCY: Polytechnic Institute of New York, Department of Transportation Planning & Engineering, PR-4227  
 INVESTIGATOR: Levi, E Tel (212)643-4486 Birenbaum, L Zabar, Z  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202)426-9665

Contract DOT-FR-64227

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1975 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$62,660

#### 11 159658

##### AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, SYSTEM SAFETY AND PASSENGER SECURITY PROJECT

The objectives of the project are to develop automated guideway transit guidelines for: (1) passenger security, (2) evacuation and rescue, (3) passenger safety and convenience services, (4) develop a model of the passengers values and needs with regard to personal security, (5) determine safe emergency deceleration and jerk maxima and passenger seat retention characteristics, and (6) evaluate and disseminate guidebook information through safety and security workshops.

As part of this effort a study on the effects of a closed-circuit television system on passenger security perception is being conducted in cooperation with the New York City Transit Authority. Subcontractors are University of Virginia and the Vought Corporation

PERFORMING AGENCY: Dunlap and Associates, Incorporated  
 INVESTIGATOR: Pepler, RD Tel (202)655-3971  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Sussman, ED Tel (617)494-2041

Contract DOT-TSC-1314

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$588,000

ACKNOWLEDGMENT: UMTA

#### 11 159659

##### AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LATERAL CONTROL AND SWITCHING (VLACS) PROJECT

The VLACS project will develop AGT vehicle lateral control and switching concepts that (1) reduce cost, weight, and complexity, (2) improve performance (ride quality), life, reliability, and increase switching capability.

The VLACS project provides for an experimental program to validate and evaluate the analytical design studies. Both contact (mechanical) and non-contact (wire follower) lateral control systems will be evaluated. To aid government officials, transit planners and system manufacturers, the VLACS project will develop lateral control and switching system guideline specifications and data base of the current technology.

INVESTIGATOR: Haines, G Tel (303) 343-8780

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

Contract DOT-UT-70088

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$869,477

ACKNOWLEDGMENT: UMTA

#### 11 159660

##### **AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LONGITUDINAL CONTROL AND RELIABILITY**

Reduce cost and complexity and increase reliability of Longitudinal Control Systems through the following steps: (1) Technology Evaluation and Model Development; (2) Vehicle Longitudinal Control Studies; (3) Reliability Enhancement Studies; (4) Entrainment and Platooning Studies; (5) Experimental Program; (6) Data Base Development and Guidelines Specification and Requirements.

PERFORMING AGENCY: Otis Elevator Company, Transportation Technology Division

INVESTIGATOR: Schumacher, PJ Tel (303)343-8780

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Contract DOT-UT-70048

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$2,562,000

ACKNOWLEDGMENT: UMTA

#### 11 159661

##### **AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM GUIDEWAY AND STATION TECHNOLOGY (GST) PROJECT**

The GST project will develop/establish guideway and station concepts that: (1) reduce construction, installation, operating and maintenance costs, (2) improve site integration and aesthetics, and (3) improve all weather operation and power distribution. To aid system manufacturers, government officials and transit planners the GST project will develop AGT guideway station design guidelines and requirements, computer based cost and implementation time models and a data base on AGT guideway and station technology. The project is expected to require 25 months.

PERFORMING AGENCY: De Leuw, Cather and Company

INVESTIGATOR: Stevens, R Tel (312)346-0424

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202)426-4048

Contract DOT-UT-70066

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: June 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$999,865

ACKNOWLEDGMENT: UMTA

#### 11 159662

##### **AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY. SYSTEMS OPERATION STUDY**

The objectives of the System Operation Study are to evaluate the applicability of AGT systems to alternative application areas as well as to make AGT computer analysis tools available to AGT systems and investigate the operational characteristics of automated guideway transit systems in network configurations such as simple shuttles or loop, line haul networks and complex or area-wide networks.

PERFORMING AGENCY: General Motors Corporation, Transportation Systems Division

INVESTIGATOR: Thompson, J Tel (313)575-8485

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: MacKinnon, D Tel (202) 426-4047

Contract DOT-TSC-1220

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 TOTAL FUNDS: \$3,200,000

ACKNOWLEDGMENT: UMTA

#### 11 160399

##### **FRA ADVANCED SYSTEMS PROGRAMS**

The FRA Advanced Systems Programs were reduced to that of only monitoring activities of other countries. The Department took this action to reflect the position that revitalizing and upgrading our existing railroads was of a higher priority than developing technology for advanced systems that would not be needed for some years to come. The Department should keep abreast of the technology developments in other countries so that when it is again decided that this country needs to develop advanced systems, we will have the right information on which to base our technical choices from our own independent evaluations of the state-of-the-art.

PERFORMING AGENCY: Massachusetts Institute Of Technology

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Kamalian, N

Contract DOT-FR-751-4331 (CR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$9,945

ACKNOWLEDGMENT: TRAIS

#### 11 170589

##### **ACCELERATING WALKWAY DEMONSTRATION**

A moving walkway which accelerates a user from a 1.5 mph entrance speed to a 7.5 mph cruise speed and then decelerates the user back to a 1.5 mph exit speed is being developed, tested and demonstrated. The system provides an up to five times improvement in cruise speed compared to conventional constant speed moving walkways.

PERFORMING AGENCY: Port Authority of New York and New Jersey, IT-06-0126

INVESTIGATOR: Fruin, J Tel (201) 963-7205

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: Dec. 1982

ACKNOWLEDGMENT: UMTA

#### 11 170593

##### **ECONOMIC FEASIBILITY OF A MAGNETICALLY LEVITATED TRANSPORTATION SYSTEM IN THE CANADIAN CORRIDOR**

The economic feasibility of a magnetically-levitated high-speed (350 km/h and (450 km/h) passenger system in the Canadian Corridor is being evaluated in terms of its relative viability vis a vis very-high-speed conventional rail (300 km/h) and intermediate-speed conventional rail (200 km/h) alternatives. Project objectives include design optimization, the investigation of possible implementation scenarios and development time frames, and an assessment of economic and/or commercial viability.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.48.77

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Boon, CJ Eastham, AR Rice, RA

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Audette, M Tel (514) 283-2880

Contract OST-77-00109

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: CIGGT

#### 11 170605

##### **AGTT/AGRT SUPPORT AND CONSENSUS**

APTA will provide UMTA's AGRT and AGTT programs with transit industry input, advice, and consensus on automated guideway transit technology and advanced group rapid transit in such areas as classification, basic requirements, service and operational requirements, passenger accommodations, system and subsystem design requirements, and system verification, certification, and acceptance.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-70058

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Feb.  
1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$113,788

ACKNOWLEDGMENT: American Public Transit Association

**11 170621****VEHICLE DATA ACQUISITION SYSTEM**

One of the SEATAC SLT vehicles will be instrumented with sensors, scanner, and data storage device to be designed and developed. The device will record the condition of 32 sensors for the most recent 20 minutes in order to aid with vehicle diagnostics in the event of a failure. A data processing system will produce a strip chart of the recorded sensor outputs within one hour of a failure. A failure analysis wing VDAS will be carried out for 6 months, and the results, including cost effectiveness of such a system, documented in a Final Report.

PERFORMING AGENCY: SEA-TAC International Airport, Port of Seattle

INVESTIGATOR: Bitts, MK Tel (206) 433-5407

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Grant DOT-WA-06-0009

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug.  
1977 COMPLETION DATE: July 1978 TOTAL FUNDS: \$88,295

ACKNOWLEDGMENT: UMTA

12 055784

**TOXICOLOGICAL AND SKIN CORROSION TESTS ON HAZARDOUS MATERIALS**

Toxicological data are inadequate for classifying certain of the materials being transported. The work is to verify further the suitability of proposed transportation health hazards classification criteria and to permit classification of additional materials according to these proposed criteria.

PERFORMING AGENCY: Department of the Air Force, Toxic Hazards Division

SPONSORING AGENCY: Materials Transportation Bureau, Department of Transportation

RESPONSIBLE INDIVIDUAL: Harton, EE, Jr Tel 202-4262311

IA AS-40079

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: June 1974 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$88,860

ACKNOWLEDGMENT: TRAIS, Materials Transportation Bureau

12 058266

**RAILROAD TANK CAR FIRE PROGRAM**

The objectives of this task are to (1) perform laboratory scale fire tests to evaluate the effectiveness of coatings in providing fire protection for tank cars and (2) develop analytical models of pool and torch fires.

PERFORMING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA

INVESTIGATOR: Mansfield, J Tel 415-965-5991

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202)426-1227

AR-30033

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: May 1973 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: FRA

12 058268

**HAZARDOUS MATERIAL RAILROAD TANK CAR TORCHING AND POOL FIRE STUDY**

The objectives of this task are to (a) construct a facility which would enable the flow structure and properties of a burning jet to be characterized and (b) design and conduct a series of torch and pool tests to evaluate the ability of railroad tank cars to withstand the effects of torching with and without insulation.

PERFORMING AGENCY: Ballistic Research Laboratory

INVESTIGATOR: Baicy, E Tel 301-272-3979

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Levine, D Tel 202-426-1227

AR-44061

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Feb. 1974 COMPLETION DATE: Apr. 1978

ACKNOWLEDGMENT: FRA

12 058838

**SYSTEM SAFETY-AN INTERDISCIPLINARY APPROACH TO TRANSPORTATION SAFETY**

The effort concerns an analysis of system safety at the planning and design stages of new transportation facilities, equipment or programs and in the operational stages of existing facilities or ongoing programs. Specific results shall be generated in methodology and guidelines and in case studies. The specific objectives of the first phase of the research are: 1. To transfer applicable systems reliability concepts to the transportation safety sector. 2. To identify and resolve key issues in transportation safety. 3. To develop a preliminary systems safety methodology applicable to the transportation modes.

**REFERENCES:**

Transportation Systems Safety. A Literature Search and Annotated Bibliography, Cantilli, EJ et al, Mar. 1976

Key Issues in Transportation Safety Horodniceanu, M et al, June 1976

Transportation System Safety Methodology Cantilli, EJ et al, Jan. 1977

Safety Issues in Transportation Horodniceanu, M et al, Feb. 1978

TSSM: Applicability to the Highway Mode Horodniceanu, M et al, Feb. 1978

A Behavioral Consideration of the Pilot-Air Traffic Controller Interface,

Salzinger, K et al, Feb. 1978

TSSM: Applicability to Rail Rapid Transit Cantilli, EJ et al, Feb. 1978

PERFORMING AGENCY: Polytechnic Institute of New York, Transportation Training and Research Center

INVESTIGATOR: Pignataro, LJ Tel (212) 643-5272 Cantilli, EJ

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Bolger, PH Tel 202-4264458

Contract DOT-OS-50241

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 COMPLETION DATE: June 1979 TOTAL FUNDS: \$174,588

ACKNOWLEDGMENT: TRAIS (PUR-50315), OST, Polytechnic Institute of New York

12 059864

**EVALUATION OF SAFETY OF LOADING AND SECUREMENT HARDWARE FOR TRANSPORTING WHEELCHAIR PASSENGERS ON TRANSIT VEHICLES**

The objectives includes: (1) developing safety guidelines for wheelchair loading equipment, (2) determining the crashworthiness of standard wheelchairs secured by selected, representative securement systems, (3) comparison of parameters other than safety of systems being tested (i.e., ease of use, acceptability to user, costs), (4) recommendation of design modifications if they are found to be needed, (5) establishment of the cost effectiveness of the securement systems, and (6) development of educational materials for users and operators of wheelchair loading and securement facilities.

PERFORMING AGENCY: California Department of Transportation

INVESTIGATOR: Gianturco, A

SPONSORING AGENCY: Urban Mass Transportation Administration, CA-06-0098-00-01

Contract CA-06-0098-00-01 (FFP)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: July 1978 TOTAL FUNDS: \$195,000

ACKNOWLEDGMENT: TRAIS (CA-06-0098-00-01)

12 081788

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT**

This project is directed at improving the performance of tank cars in derailments and minimizing the danger of catastrophic tank car accidents. When initiated, it consisted of 12 Phases with additional Phases subsequently added. Phase 03--Materials Study; Phase 05--Head Study; Phase 07--Safety Relief Devices; Phase 08--Reduced Scale Model Studies; Phase 10--Design Study Car; Phase 12--Vessel Failure Research; Phase 13--Head Shield Study; Phase 14--Stub Sill Buckling Study and Phase 15--Switchyard Impact Tests are completed. The other phases, on which work is continuing, are the following: Phase 01--Accident Review; Phase 02--Accident Data Analysis; Phase 04--Literature Review; Phase 06--Safety Valve in Liquid Study; Phase 09--Design Study, Tanks and Attachments; Phase 11--Thermal Effects Studies; and Phase 16--Tank Car Wear Experiments.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Phillips, EA Tel 312-5673607

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099389

**RAIL VEHICLE SAFETY RESEARCH PROGRAM**

This program has as its objectives: (1) Increase the safety of hazardous material cars; (2) Decrease number and severity of accidents caused by vehicle component failures; (3) Decrease the number of accidents caused by human error; (4) Reduce the number and severity of grade crossing accidents; (5) Improve communication and control systems. Torch and relief valve test facilities have been completed and used for the on-going hazardous material tank car project. On-board automatic inspection and monitoring systems are being developed as a means of component failure prevention. Development of cab and train handling simulator as part of the human factors project began late in FY 75. Modularized grade crossing

equipment has been developed under the grade crossing safety project, which started in early FY 75.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

#### 12 099392

##### LOCOMOTIVE CAB SAFETY

A number of special projects directed toward improving the safety of the work space provided for operating crews in the cabs of locomotives have been undertaken. After an in-depth review of FRA-funded studies of accidents and potential hazards, it was determined that the railroad industry should respond with effective cab improvements. AAR had Electro-Motive and General Electric develop "clean" locomotive cab mock-ups. Modifications were based on reviews of these mock-ups. As a result, about 20 improvements are being incorporated in the cabs of production locomotives. These changes eliminate potentially hazardous sharp corners and edges, provide protective padding on certain exposed surfaces, provide added protection to prevent injuries associated with cab doors, provide improved drinking water facilities and improved sanitary facilities. Another project is a study of the consequences of head-on and rear-end collisions between trains. A test program is intended to provide the information necessary to redesign locomotives to increase the survival rate in train-to-train collisions. Furthermore locomotive cab seats are being examined in light of human factors criteria to arrive at generic specifications for the design and development of safer, more comfortable seats to be incorporated in new locomotive deliveries.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: AAR

#### 12 099424

##### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 2-ACCIDENT DATA ANALYSIS

Analysis of accident data is handled under this phase. A general breakdown of the 1965-1970 data shows two main damage categories-mechanical and thermal. With few exceptions, the mechanical damage occurs first in the accident sequence. Exceptions involved fires originating from non-tank car sources. The analysis under this Phase includes the assignment of dollar losses incurred by the railroads due to product loss from the tank cars in these accidents. These losses are categorized by the specific types of damage which cause them. From this, the potential values of design solutions are determined. The values of overlapping solutions are also given. Some overlap positively and some negatively. For example, the value of a combined head and shell shield is greater than the sum of their individual values. Conversely, the value of a combined head and thermal shield is less than the sum of their individual values. All values must be reduced by the estimated efficiencies of actual design solutions which are developed. This leads to actual "benefit" values for each solution. The final cost effectiveness evaluation is made made simply comparing the actual benefit values with the estimated costs of solutions.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

#### 12 099425

##### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 11-THERMAL EFFECTS STUDY

The whole thermal question, including fire environment and thermally induced stresses, is being covered under this phase. The major activity has been a search for a practical heat shield material, such as an ablative, intumescent, or simply an insulative coating, that can be applied to the non-insulated 112A (114A) pressure tank cars, which are the cars most vulnerable to violent rupture from external heat. Many companies which produce fire protective coatings have submitted samples which were studied in a laboratory fire test apparatus which was designed for initial screening. Two of the most promising materials were selected for application to 1/5 scale model tank cars which were subjected to large enveloping fires. These tests were conducted at the White Sands Missile Range in cooperation with the FRA. The objectives were to confirm laboratory findings and theoretical analyses, to ascertain some of the properties of fires which were not yet defined, finally prepare subsequent full scale tests. This was followed by two full scale pool fire type tests, one with uncoated and the other with sprayed on type coating tank. A report on these fire tests has been published. Other current major activities under this Phase concerned impact and accelerated service tests (ALT) of tank cars equipped with sprayed on coating type and insulation-jacket type thermal shields. These tests were conducted at the DOT Transportation Test Center to evaluate in service reliability of the thermal shields. The tank cars will accumulate a total of approximately 160,000 miles in the facility for accelerated tests (FAST) program at the DOT Test Center. A report covering the results of inspections after 2 to 5 years simulated life has been published. The ALT program was completed May 31, 1978.

See also RRIS 12A 081788 and 12A 058266.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

#### 12 099427

##### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 7-SAFETY RELIEF DEVICES-GENERAL

This Phase covered all currently used safety relief devices on all classes of tank cars. It had the general objective of seeking means, through design changes in these devices, for safer containment, or safer release, of hazardous products in accidents. Activity did not progress beyond initial planning since there was not sufficient evidence that existed deficiencies or that design changes would lead to significant improvement. This Phase has been completed.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

#### 12 099428

##### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 6-SAFETY VALVE DISCHARGE CAPACITY

When a tank car carrying liquified compressed gas is heated in a fire, its contents can expand to where the tank can become nearly shellfull at the safety valve pressure setting. The safety valve must then maintain safe tank pressure by momentarily discharging liquid. It may also be called upon to do this through liquid discharge in the event the tank is overturned and exposed to fire. As in other pressure vessel codes, the tank car specifications require that safety valves be sized and tested on the basis of vapor discharge. There being no firm data on liquid discharge capacities, this Phase was established with the objective of determining such capacities by means of full-scale test. Toward this end, a special 20,000 gallon test tank was fabricated with provisions for mounting the currently used safety valves on both the top and bottom of the tank. The tank has been installed at Edwards Air Force Base, and tests have been run using water, air, and vapor and



liquid LPG. This program is being conducted on a cooperative basis with the FRA. Results, not yet available, will be published after all data is reduced.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration  
SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

#### 12 099436

##### **RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 1-ACCIDENT DATA COLLECTION**

This is a major Phase and deals with the collection and cataloging of accident data. Any accident involving a tank car, loaded or empty, in which there is damage to the tank, its attachments and fittings, or its insulating steel jacket, is included. During the first two years of the project, such data were collected for the six year period 1965-1970. Currently, an update is complete covering the five year period 1971-1975 and a report is in preparation. Following this, procedures are established for collecting data on a continuing basis. Most of the information has been coded and computerized. For the six year period 1965-1970 the files contain data on 3853 tank cars damaged in 2321 accidents. This corresponds to an annual average of 642 tank cars damaged in 387 accidents.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center  
SPONSORING AGENCY: Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

#### 12 130946

##### **QUANTITATIVE DESCRIPTIONS OF TRANSPORTATION ACCIDENTS INVOLVING HAZARDOUS MATERIALS**

Description: Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of the five major environments (impact, fire, puncture, crush and immersion) experienced by casks or containers in air, highway and rail transportation. Analyses of these predicted environments to assess possible revisions or regulatory standards. Consideration of specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident, to determine threat probabilities for potentially large contamination incidents. Revision of analytical descriptions to make the results more applicable to an increasing number of specific risk analysis studies aimed at optimizing procedures for transporting radioactive materials. Compilation of pertinent accident information in a data bank to provide retrievability of specific information to parties performing analyses.

This project is also supported by Sandia Laboratories.

PERFORMING AGENCY: Sandia Laboratories, Division of Applied Mechanics  
INVESTIGATOR: Priddy, TG Hartman, WF Foley, JT  
SPONSORING AGENCY: Energy Research and Development Administration, Division of Waste Management and Transportation

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GPW 51 1)

#### 12 135594

##### **PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS**

Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of five major transportation accident environmental categories (impact, fire, puncture, crush and immersion) that may be experienced by casks or containers in air, highway, rail, and water transportation. Analyses of these environmental categories can be used in the consideration of possible revisions of the regulatory standards. Consider the specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident to determine the threat probabilities for potentially large

contamination incidents. The analytical description available in these studies are applicable to specific risk analysis studies aimed at optimizing procedures for transporting HAZARDOUS materials. Compilation of pertinent accident information in a data bank provides retrievability of specific information to parties performing transportation accident analyses.

PERFORMING AGENCY: Sandia Laboratories, Applied Mechanics Division II 1282, ALO 117B

INVESTIGATOR: Priddy, TG Tel (505) 264-6764 Foley, JT Davidson, CA McClure, JD

SPONSORING AGENCY: Department of Energy, Transportation Branch, Div of Environ Control Technology

RESPONSIBLE INDIVIDUAL: Brobst, WA Tel (202) 353-5361

Contract AL051 (AL0517B)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1975

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 12 135596

##### **MAINTENANCE OF A TRANSPORTATION ACCIDENT ENVIRONMENTAL DATA BANK**

The maintenance of this data bank involves the active pursuit of sources of new data, the updating of indices, and responding to official users who wish to obtain environmental data. A necessary part of this continued work is the processing of data and entry into the storage and retrieval system. As needs for new data are identified, these will be sought. User requests for nonexistent data are expected to be a major contributor to this identification.

##### **REFERENCES:**

Transportation Accident Environment Data Index Foley, JT; Davidson, CA, SAND 75-0248

PERFORMING AGENCY: Sandia Laboratories, AL 0517A

INVESTIGATOR: Foley, JT Tel (505) 264-3036

SPONSORING AGENCY: Energy Research and Development Administration, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract AT(29-1) 789

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974 TOTAL FUNDS: \$216,000

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 12 135599

##### **FULL SCALE VEHICLE TESTING PROGRAM**

This project plans full scale accident tests to determine the integrity of shipping casks for transportation of nuclear wastes. The problem of transporting nuclear wastes becomes more acute as operating reactors increase. Demonstrations of shipping container integrity are necessary. Three extreme accident full scale tests using obsolete casks are planned: (1) High speed locomotive impact on stalled truck cask; (2) High speed derailment of rail cask into solid abutment followed by fire; (3) Truck mounted cask at high speed into solid barrier. Modeling and analysis will precede instrumented tests. Results will aid in prediction of performance of currently used, better designed casks.

PERFORMING AGENCY: Sandia Laboratories, AL 3617A

INVESTIGATOR: Yoshimura, RH Tel (505) 264-2452

SPONSORING AGENCY: Energy Research and Development Administration, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract E(29-1)-789

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1975 TOTAL FUNDS: \$1,170,000

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 12 135719

##### **DYNAMIC PROPERTIES OF PACKAGING MATERIALS IN TRANSPORT ACCIDENTS**

The aim of the project is to develop data on dynamic material properties for materials of construction for shipping casks, particularly those properties required for analysis of transport accidents. Structural problem areas during dynamic loading of shipping casks will be delineated; experimental techniques (mostly models) will be used for material and structure studies. Results will be used as benchmarks for computer codes being developed at LASL for dynamic loading problems of shipping casks.

PERFORMING AGENCY: Battelle Memorial Institute, CH 0407A  
 INVESTIGATOR: Robinson, RA Tel (614) 424-6424 X3414  
 SPONSORING AGENCY: Energy Research and Development Administration, Environmental Control Technology Division  
 RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract W-7405-ENG-92

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 12 136084

##### TRANSPORTATION SAFETY STUDIES

The aim of the project is to develop and use a model for assessing the risks associated with the shipping of radioactive and other hazardous materials. Failure characteristics and thresholds will be determined for crush, impact, puncture, fire, and water immersion. Evaluation of release consequences will be assessed. Existing data sources on equipment failure rate, accident frequency, and accident severity will be used to fullest extent possible, supplemented by surveys or other means when data is not available.

##### REFERENCES:

An Assessment of the Risk of Transporting Plutonium Oxide and Liquid Plutonium Nitrate by Truck, McSweeney; Hall, BNWL-1846, Aug. 1975

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs, RL 5917B

INVESTIGATOR: Rhoads, RE Tel (509) 942-3607

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5466

Contract DOE-AT-45-1-1830

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1973 COMPLETION DATE: July 1978 TOTAL FUNDS: \$968,000

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 12 138531

##### SAFETY AND RELIABILITY

The objective is to improve the safety and reliability of urban rail systems through data gathering, analysis and hardware development. This includes vehicle crashworthiness analysis (current and proposed models) and computer models, feasibility studies of obstacle detection and study of safety hardware along with establishment of National Reliability Data Bank.

PERFORMING AGENCY: Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract UM-604

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1974 TOTAL FUNDS: \$2,800,000

ACKNOWLEDGMENT: UMTA

#### 12 138567

##### SAFETY VALVE STUDY

By analysis and small scale experiments, study the flow phenomena occurring when a safety valve of a pressurized tank car discharges when engulfed in a fire.

PERFORMING AGENCY: Maryland University, College Park

INVESTIGATOR: Sallet, DW Tel (301) 454-4216 Ext 4

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202) 426-1227

Contract DOT-FR-64181

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Feb. 1980

ACKNOWLEDGMENT: FRA

#### 12 148324

##### THE DEVELOPMENT OF A SYSTEMS RISK METHODOLOGY FOR SINGLE AND MULTI-MODAL TRANSPORTATION SYSTEMS

The purpose of the research is to develop and verify a probabilistic systems methodology for the quantitative risk assessment of existing or future transportation systems. The objective of the first phase of the research was to develop primary risk models for estimating the probability of failure of each major component in air transportation, rail transportation and highway transportation. The second year work involves continuation and

verification in the highway mode only.

##### REFERENCES:

Development of a Risk Methodology for Transportation Systems Safety, Transportation Systems Safety Research Group, Technical Report, Feb. 1976

Development of a Risk Methodology for Transportation System Safety, Final Report, Oct. 1976

PERFORMING AGENCY: Illinois University, Urbana, Department of Mechanical & Industrial Engineering

INVESTIGATOR: White, RA Tel (217) 333-0356

SPONSORING AGENCY: Department of Transportation; Illinois University, Urbana

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-50238

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 TOTAL FUNDS: \$159,000

ACKNOWLEDGMENT: DOT

#### 12 148348

##### TRANSPORTATION SAFETY INFORMATION SYSTEM (TRANSIS)

The objective of this system is to make data and information on safety performance and on on-going safety activities in all transportation modes readily available to DOT managers to allow intermodal comparisons. The system contains national data on accidents, injuries, and fatalities by month and by transportation mode, with certain exceptions due to limitations within modal accident reporting systems. Data and information are collected from DOT operating elements on a quarterly basis.

The quarterly Transportation Safety Information Report is available from NTIS.

PERFORMING AGENCY: Transportation Systems Center, OE-608

INVESTIGATOR: Gay, WF Tel (617)494-2450

SPONSORING AGENCY: Department of Transportation, Office of Environment and Safety

RESPONSIBLE INDIVIDUAL: McDonald, G Tel (202)426-4468

STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: DOT

#### 12 170651

##### AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS

Study of problems linked with the perception of acoustic warning signals (noise produced by track working machines) and determination of optimum acoustic and visual signals for the warning, of maintenance gangs working on the track, of the approach of trains. Study of systems for the automatic initiation and transmission of the announcing of trains approaching the track working site. The study of the noise produced by track working machines has formed the subject of a draft UIC leaflet, examined by the competent Sub-Commissions of the UIC in 1974. The studies and tests should, in a few months, permit the best acoustic signals for the warning of gangs working on the track to be defined. Tests on automatic radio transmission announcing systems are shortly going to be undertaken.

Eight reports have been published to date. Question A124.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 12 170780

##### SAFETY AND SYSTEM ASSURANCE

This project will continue the development and design of a program which reflects the priorities and requirements of the transit operating properties, to implement the highest priority management/software work statement, provide data and information regarding support for UMTA/TSC in transit matters concerning Safety and System Assurance.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60061

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Dec. 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$269,610

ACKNOWLEDGMENT: American Public Transit Association

12 179336

**STANDARDIZED ANALYSIS OF FUEL SHIPPING CONTAINERS**

**OBJECTIVE:** Develop a system of unified computer programs for the standardized criticality safety, shielding and thermal analyses of fuel shipping containers. **SCOPE:** The scope of work for FY1978 includes: (1) Implementation of the functional modules (NITAWL, XSDRNPM, KENO-IV COUPLE, ORIGENS, ICE, MORSE, BONAMI), the control models (CSAS1, CSAS2, SAS1, SAS2, SAS3, SAS4) and the SCALE system data base on the Brookhaven National Laboratory CDC-760C computer for NRC use (May 1978). (2) The HEATING5 module will be implemented into the SCALE system. HTAS1, heat transfer analysis in multidimensional systems, will be written. HEATING5 and HTAS1 will be documented as sections in the SCALE system user's manual. Heat transfer libraries will be added to the SCALE system data base (August 1978). (3) The Monte Carlo criticality code KENO-V (Supergrouping and COMGEOM) will be implemented into the SCALE system. KENO-V will be documented as a section in the SCALE system user's manual (April 1978). (4) A Monte Carlo heat transfer code will be implemented into the SCALE system (August 1978). (5) The criticality safety and shielding analytical sequences will be modified such that they can be operated on a CRT terminal interactive basis. The Materials Information Processor will be modified to accept the arbitrary specification of material compounds and material mixtures (April 1978). (6)

Development of a geometry graphics package will be initiated. This package will provide the SCALE system user to represent his problem geometry. A hard copy device for recording this information will be acquired. (September 1978). (7) An optimization package will be written for the SCALE system. This package will be used in the development of the following standard analytical sequences (September 1978). CSAS-3-Criticality Safety Analysis in One-Dimensional Geometry with Most-Reactive Fuel-Moderation Search. CSAS-4 -Criticality Safety Analysis in Multidimensional Geometry with Most-Reactive Fuel-Bundle-Lattice-Pitch Search. (8) The KENO-COMGEOM geometry package will be incorporated in the SCALE system version of MORSE.

**PERFORMING AGENCY:** Oak Ridge National Laboratory

**INVESTIGATOR:** Greene, N Henderson, R Petrie, L Turner, W Westfall, R Whitesides, G

**SPONSORING AGENCY:** U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, B0172

**Contract**

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Oct. 1977 **COMPLETION DATE:** Sept. 1978 **TOTAL FUNDS:** \$280,000

**ACKNOWLEDGMENT:** Smithsonian Science Information Exchange (CU 811 2)

13 059244

**RAILROAD PASSENGER SYSTEMS AND EQUIPMENT RESEARCH SUPPORT**

In the area of railroad electrification, a report shall be prepared on railroad electrification describing its potential for application within the U.S. rail system. The report may include, but not be limited to, national benefits and an investigation and subsequent recommendation of the forces which would encourage the railroads to electrify. In the area of passenger train rolling stock R&D, the DOT/FRA has a role in the assessment and evaluation of train systems which may be introduced in the U.S. through Amtrak or other railroads. The FRA must be prepared to render a judgment on the suitability of new equipment being placed into service within the U.S. rail network.

PERFORMING AGENCY: Small Business Administration  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Novotny, RA Tel (202)426-7612

IA DOT-FR-64244 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: May 1976 COMPLETION DATE: May 1977 TOTAL FUNDS: \$396,890

ACKNOWLEDGMENT: TRAIS

13 129700

**RAILROAD ELECTRIFICATION/ENERGY PROGRAM**

FRA is in the planning state of an electrification program for identifying the nation's and the railroad operator's benefits, which accrue from electrification, determining the incentives which the railroad industry needs to start electrification, and doing R&D where it is most cost effective in the field of electrification. Already established is the fact that 100,000 barrels of petroleum would be saved per day if 22,000 miles of track were electrified (and 22,000 seems economically justified.). Additional savings would result if modal shifts from auto and intercity truck freight occurred. There are plans to electrify the 14-mile passenger track at the Transportation Test Center. The immediate use of the electrified track will be for testing of Northeast Corridor equipment prior to putting it into revenue service and for determining cost effective methods of installing the catenary system. In addition, the railroad industry will be surveyed to determine what use they may have for the facility.

SPONSORING AGENCY: Federal Railroad Administration, Office of Passenger Systems Research and Development  
RESPONSIBLE INDIVIDUAL: Novotny, RA Tel 7612

STATUS: Proposed NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

13 160275

**CONDUCT A RAILROAD ELECTRIFICATION PROGRAM IMPACT ANALYSIS**

The contractor will perform a program impact analysis to isolate and present in a succinct, informative manner those factors of railroad electrification which bear upon Government decision making. Following the analysis, the Contractor will develop a management interchange and communications package (MICP) to facilitate consultation by FRA's Office of Passenger Systems with the various concerned agencies. The program impact analysis and MICP work will be followed by the development of an executive summary of the electrification report draft material.

PERFORMING AGENCY: Virginia Research Institute, Incorporated  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Novotny, RA Tel (202) 426-9564

Contract DOT-FR-737-4321 (FFP)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: \$24,780

ACKNOWLEDGMENT: TRAIS

13 164812

**COMPUTER SIMULATION OF THE OPERATION OF SUBWAY AND ELECTRIC-TRAINS**

An accurate mathematical model of electric train systems is prepared including models of the powering and braking systems, track configuration, etc. Equations of motion are solved numerically, and the operation of the system is simulated taking into consideration operating and other con-

straints. A numerical optimization routine determines the optimum operating and design parameters by minimizing an objective function. The objective function is the energy consumption of the system, or the travel time of the trains, or a suitable weighted combination of the energy consumption and travel time. The method can be used in designing new systems, or modifying existing systems using the objective evaluation of the simulated results for decision making, or the method can be used for finding the optimum operating mode of existing systems and thereby reducing the energy requirement or travel time, or both. /RTAC/

PERFORMING AGENCY: Toronto-York University Joint Program in Transp  
INVESTIGATOR: Fenton, RG

STATUS: Active NOTICE DATE: May 1977 START DATE: Apr. 1977 COMPLETION DATE: Mar. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

13 170609

**PARAMETRIC STUDIES FOR RAILROAD ELECTRIFICATION AND TRACTION**

This effort includes site specific system studies of various train consists for passenger and freight transportation. A simple computer train operation program is available permitting us to simulate traction equipment parameters and speed profiles along the route in order to achieve the specified goals. Traction equipment characteristics and their interaction with the assumed speed profiles are evaluated. Speed profiles are modified to match the anticipated track improvements. The work centers around the Northeast Corridor, though studies of other high density lines are anticipated. Findings are published, at frequent intervals, in the form of letter reports to the sponsor.

PERFORMING AGENCY: Jet Propulsion Laboratory  
INVESTIGATOR: Macie, TW Tel (213) 354-4432  
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

Contract DOT-AR-30006

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1977 COMPLETION DATE: Oct. 1978

ACKNOWLEDGMENT: FRA

13 170653

**HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEED**

This study concerns the performance of the "overhead contact system/pantograph system" at high speeds and also the problem of power transmission under severe loading conditions. The first remit was to prepare a mathematical model for the study of the "overhead contact system/pantograph system". A first recommendation has been produced for pantographs and lightoverhead contact systems for high voltage current. Exact recommendations concerning the same problem are now being prepared. The study of other sections of the program of work is progressing (measuring equipment to determine the upward contact force, determination of the currents acceptable at the point of contact, etc.).

Eight reports have been published to date. Question A129.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

13 179334

**ELECTRIFICATION OF HIGH-DENSITY LINES**

The 4R Act provides loan guarantees for electrification of high-density lines if it can be shown economically beneficial. The 300-mile line between Harrisburg, Pa., (Enola) and Pittsburgh, Pa., (Conway) carries the heaviest freight tonnage of any U.S. route. This segment and certain segments of presently electrified lines east of Harrisburg will be studied in terms of projected traffic levels; projected costs of electric power and diesel fuel; most effective methods of electrified operation; electric power supply and catenary system; effects of electrification on signals and communications; and financial implications of electrification.

PERFORMING AGENCY: Gibbs and Hill, Incorporated  
INVESTIGATOR: Hulme, WN Tel (212) 760-4697  
SPONSORING AGENCY: Consolidated Rail Corporation  
RESPONSIBLE INDIVIDUAL: DeGennaro, RE Tel (215) 594-1000  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1977 COM-  
PLETION DATE: 1979

15 129701

**METRO IMPACT STUDY**

As part of its ongoing programs, the Metropolitan Washington Area Council of Governments is conducting for UMTA an assessment of impacts of the METRO rail system in the Washington area. The program is somewhat narrower in scope than the BART Impact Work, concentrating on traveler impacts.

PERFORMING AGENCY: Metropolitan Washington Council of Governments, 1225 Connecticut Avenue, NW

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: McQueen, J

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UMTA

15 148353

**COMMUNITY AND CITIZEN INITIATIVES FOR DEVELOPING PASSENGER TRANSPORTATION CENTERS AT EXISTING HISTORIC RAILROAD STATIONS**

To encourage joint use of existing historic terminals as intermodal transportation centers in combination with other community uses and community use of other historic transportation facilities and to identify implementation and funding problems, a study of railroad terminal locations is underway. This study of transportation facilities will be made in consultation with municipal, civic and private organizations concerned with preservation and reuse programs. The study will document the following: Adaptive reuse as transportation centers and benefits therefrom; other adaptive community uses and their benefits; financial data and procedures involved in achieving such utilization.

PERFORMING AGENCY: Anderson Notter Finegold, Incorporated

INVESTIGATOR: McGinley, PG Tel (617) 227-9272

SPONSORING AGENCY: Department of Transportation, Office of Environmental Affairs

RESPONSIBLE INDIVIDUAL: Crecco, RF Tel (202)426-4298

STATUS: Active NOTICE DATE: Feb. 1978 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: DOT

15 160469

**BART IMPACT PROGRAM, THE LAND USE PROJECT**

A major study area of the overall BART Impact Program, the Land Use Project will examine the effects of BART on (1) decisions about the location or residences, urban development, and activity patterns within the San Francisco Bay Area, (2) the behavior of the market for real property which exercises a major influence of such decisions, and (3) the resultant spatial distributions of people, activities, and development.

PERFORMING AGENCY: Metropolitan Transportation Commission

SPONSORING AGENCY: Office of the Secretary of Transportation

Contract DOT-OS-30176/205 (CC)

STATUS: Active NOTICE DATE: June 1978 START DATE: Jan. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$600,000

ACKNOWLEDGMENT: TRAIS

15 179331

**MARTA IMPACT STUDY**

This study is designed to provide a continuing assessment of the impacts of the new rail rapid transit system in Atlanta. Work prior to the scheduled opening in later 1978 concentrates on obtained "before" and base-case data and on the impacts of construction. Operational impact measurement begins in 1979.

PERFORMING AGENCY: Atlanta Regional Commission

INVESTIGATOR: Day, B Tel (404) 656-7700

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: McQueen, J Tel (202) 426-2360

Contract GA-09-0037

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1983 TOTAL FUNDS: \$750,000

ACKNOWLEDGMENT: UMTA

15 179338

**THE URBAN TRAVEL DEMAND FORECASTING PROJECT**

This research project was funded to develop and apply behavioral travel demand forecasting models for different policy issues. To date, the project has prepared a data base and methodology for study of the forecasting validity of behavioral travel demand models. Under the current research grant (APR74-20392) the investigators have carried out validation tests of the data and models, and have applied these techniques to selected policy analyses in cooperation with local transportation authorities. In addition, with Department of Transportation funding, they have conducted a short course in forecasting methods for planning officials. This supplemental grant will allow for further validation of the models by providing easy access to project data and software, so that researchers and planners from other regions may supplement, check and generalize project findings.

PERFORMING AGENCY: California University, Berkeley

INVESTIGATOR: Mcfadden, DL

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, DAR74-20392 A06

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1978 COMPLETION DATE: June 1979 TOTAL FUNDS: \$29,767

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1917)

15 179339

**LABORATORY TESTING OF PREDICTIVE MODELS**

This project will improve the existing Integrated Transportation and Land Use Model Package (ITLUP) developed previously by a team headed by the present principal investigator. Several existing models will be incorporated into ITLUP, including a basic employment model, a nonbasic employment model based on the Harris model, and a residential model disaggregated by income class based on the DRAM model, a derivative of IPLUM developed by the principal investigator under a previous grant. Several other existing models will be evaluated for possible integration, including modal split models, multipath assignment procedures, and air pollution emission and diffusion models. In addition, an attempt will be made to develop an operational housing characteristics model, and to incorporate simple models to investigate the energy consequences of different urban forms and transportation networks. Finally, the improved package will be used to test the impact of several policy options: Several low capital options in urban transportation will be tested such as gasoline taxes or quotas, parking taxes, parking space restrictions, and commuter taxes. The difference in the land use impacts of rail transit lines and busways will also be tested.

PERFORMING AGENCY: Pennsylvania University, Philadelphia, School of Arts & Sciences, City and Regional Planning

INVESTIGATOR: Putman, SH

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR73-07840 A04

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$99,950

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1344 1)

15 179672

**EVALUATION OF ALTERNATIVE RURAL FREIGHT, TRANSPORTATION, STORAGE AND DISTRIBUTION SYSTEMS**

Measure the social and economic costs and benefits of alternative rural transportation networks on rural communities. Develop and employ procedures to evaluate the costs and benefits of ownership alternatives and abandonment of railroad lines. The study will examine the social and economic impacts of six specific branchline abandonments which have taken place since World War II. Criteria of community success such as sales tax receipts, bank deposits, property values, school enrollment, telephone and utility services, and population will be utilized to compare communities on abandoned branchlines with: Nearby communities with continued rail service; distant communities with continued rail service; and nearby communities without rail service for an extended period, within the abandoned communities, the economic success of firms directly affected by abandonment, such as elevator and trucking firms, will be analyzed in terms of investment, profitability, and commodity and product mix.

PERFORMING AGENCY: South Dakota State University, Department of Economics, SD00789

INVESTIGATOR: Lamberton, CE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072991)

**16 128051****RAIL VEHICLE POWER AND ENERGY CONSUMPTION STUDY**

The purpose of this study, which is part of the general Energy Management Program, is to determine the power requirements and energy consumptions of transit vehicles operating in free air and in tunnels under various conditions as specified by operational parameters such as acceleration, maximum speed, station spacing etc. The study first establishes the mechanical limits of power requirements, energy consumption, regeneration and energy storage in terms of the operational conditions and free air and in tunnels. The calculations within this part of the study will use the results of the aerodynamic drag study (project #3605) and operational criteria established in other studies. The study then incorporates the performance characteristics of various propulsion systems-DC series, shunt or separately excited motors, as well as AC motors-with and without energy saving devices such as choppers and flywheels. The study relies here on input from investigations carried out by the Electrical Group. The resulting calculations will produce actual power and energy consumption profiles of the different propulsion systems under the various operational conditions considered. The energies associated with drags, momentum change, regeneration and equipment losses will be identified. The results will be used in the Economic Evaluation Program to determine the viabilities of the various propulsion options. The viable alternatives will then be investigated further with refined performance data and extended operational ranges in order to provide basic data for preliminary conceptional design of the total energy system. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can, 3607

INVESTIGATOR: Soots, V

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

**16 129721****MEASUREMENT OF RAIL TRANSPORTATION FUEL CONSUMPTION**

This project has the objective of establishing accurate information concerning fuel consumption of railroad freight trains in a variety of actual operations. Initial emphasis will be on TOFC/COFC service. Accurate basic data is being collected in cooperation with a number of railroads, for revenue-service trains, and analyzed to provide results of general applicability. The analysis will be utilized to validate an analytical model developed for predicting fuel consumption as a function of various parameters and operating conditions.

**REFERENCES:**

Railroads and the Environment-Estimation of Fuel Consumption in Rail Transportation, FRA-OR&D-75-14.II, Sept. 1977  
Freight Service Measurements - Vol II

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Hopkins, JB Tel 617-494-2148

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Koper, JM Tel 202-426-0808

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: May 1978

ACKNOWLEDGMENT: FRA

**16 148321****ENERGY MANAGEMENT FOR ELECTRIC POWERED TRANSPORTATION SYSTEMS**

The purpose of this research is to further the state-of-the-art of energy management in electrically powered transportation systems. Inherent in this objective is the determination of the relationships between the energy consumption of electric vehicles and their design capabilities and operating practices. Through this understanding, energy management strategies may be evaluated within a cost-benefit framework. The objectives of the work are: 1) To develop a realistic computer-based simulation model of energy consumption and cost in electric-powered transportation systems. This model will incorporate and link together the following three modules: (a) Train Performance Programs; (b) Energy Consumption Simulation; (c) Energy Cost Simulation. The advantage of this approach lies in its flexibility as it is anticipated that this technique will be able to accommodate any present or future system. 2) To develop strategies and guidelines for increasing the energy efficiency of electrically powered transportation systems. Used by the transit operators and designers, these guidelines would be applied to the modification of present systems and the construction of new ones. The strategies will be evaluated within the framework of the simulation model, and validated through application to selected real-world systems.

PERFORMING AGENCY: Carnegie-Mellon University, Department of Mechanical Engineering

INVESTIGATOR: Uher, RA Tel (412) 578-2960

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Hopkins, JB Tel (617) 494-2023

Contract DOT-OS-60129

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$170,840

ACKNOWLEDGMENT: DOT

**16 165021****ENERGY INTENSITY OF VARIOUS TRANSPORTATION MODES**

This study provides an overview of the existing literature related to Energy Intensity (EI) of various transportation modes. These transportation modes include intracity (auto, bus, automated guideway transit system, vans, heavy rail, and light rail transit), and intercity (airplanes, autos, buses, trucks, rail, waterways and pipelines) modes of transportation for passenger and freight movement. Wherever possible, an attempt has been made to correlate energy intensity as a function of operating conditions such as speed, load factor, type of commodities being moved, etc. Use of both statistical and engineering approaches has been made for estimating energy intensity figures. It is concluded that energy intensity values have a considerable range depending upon the operating conditions, types of hardware, trip characteristics, load factor and type of commodities being shipped. The major output of the study is a list of suggested EI values for several transportation modes. The study is highly data intensive. Finally, guidelines are also provided for furthering the state-of-the-art related to energy intensity work.

PERFORMING AGENCY: Mittal (RK)

INVESTIGATOR: Mittal, RK Tel (213) 648-6633

SPONSORING AGENCY: Oak Ridge National Laboratory; Department of Transportation

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Jan. 1978

ACKNOWLEDGMENT: Mittal (RK)



17 059062

**SOFTWARE DEVELOPMENT FOR THE PROJECTION OF COMMODITY FLOW PATTERNS**

The objective is for the development of data reduction and analysis programs to project commodity flow patterns as an input to development of a national transportation simulator capability.

PERFORMING AGENCY: Transportation Systems Center  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Chamberlain, C Tel (617) 494-2087

In-House

STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: TRAIS (R6831)

17 059866

**COMPUTER ASSISTED INFORMATION SYSTEM ON TRANSIT SCHEDULES, ROUTES, AND FARES**

This project will develop, demonstrate, and evaluate a prototype computer assisted transit information system to more effectively respond to telephone requests for information on transit schedules, routes, and fares.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority  
INVESTIGATOR: Warrington, J Tel (202) 637-1326  
SPONSORING AGENCY: Urban Mass Transportation Administration, DC-06-0154  
RESPONSIBLE INDIVIDUAL: Durham, JS Tel 202-4264022

Grant DC-06-0154 (FFP)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976 TOTAL FUNDS: \$435,000

ACKNOWLEDGMENT: TRAIS (DC-06-0154)

17 099386

**RAIL SAFETY INFORMATION SYSTEM**

This computer system contains carrier originated accident and exposure data, government originated inspection data on track, equipment, signals, operating practices and hazardous materials and, in addition, the national railroad-highway crossing inventory is part of the system. The system is used for report production and research.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Systems Analysis and Program Development  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: George, BF Tel (202)755-9263

STATUS: Active NOTICE DATE: Jan. 1977

ACKNOWLEDGMENT: FRA

17 138526

**MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM**

To develop and implement an automated freight car scheduling system. A prototype capability will first be developed. This research and demonstration project will establish the feasibility and determine the operational benefits of automated freight car scheduling. The project will provide considerable impetus to interline freight car scheduling reports and demonstrations will be made available to the railroad industry and the procedures, computer programs and related documentation of MoPac's Transportation Control System including the automated freight car scheduling system will be made available to interested railroads.

## REFERENCES:

State-of-the-Art Survey Apr. 1976  
Project Work Plan Mar. 1976  
System Functional Requirements July 1977

PERFORMING AGENCY: Missouri Pacific Railroad  
INVESTIGATOR: Sines, GS  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608

Contract DOT-FR-65139

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Nov. 1975 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$5,500,000

ACKNOWLEDGMENT: FRA

17 148350

**EMPLOYEE INFORMATION SYSTEM. PHASE I**

To review and analyze for validity and usefulness currently available railroad employee wage and employee operating statistics and to develop an employee information system that will consist of valid and useful data from currently available sources in a form readily transferable to research and publication. Preliminary productivity measurements will be developed and recommended to the FRA.

PERFORMING AGENCY: Booz-Allen Applied Research, Incorporated  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract DOT-FR-T5164

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: May 1977 TOTAL FUNDS: \$69,768

ACKNOWLEDGMENT: FRA

17 159625

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 1. STRUCTURING ORGANIZATIONAL CONTROL MECHANISMS TO IMPROVE CAR UTILIZATION**

Examine information systems and corporate relationships which foster utilization improvements. Case studies will be conducted which focus on those decisions which require joint analysis by various departments. Based on this analysis, a new approach will be developed and tested and recommendations then will be made to the industry. Investigate the most critical information needs associated with improved car utilization and the changes in the line of responsibility required to facilitate effective use of the information.

PERFORMING AGENCY: Association of American Railroads  
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
Wooden, DG Tel (202) 293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$295,000

ACKNOWLEDGMENT: AAR

17 159628

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 4. NATIONWIDE FREIGHT CAR MANAGEMENT**

To begin planning a more efficient nationwide freight car management system. Continue the evaluation of the expended Clearinghouse Experiment. Continue the evaluation of Car Service Rules, Orders, and Directives. Design and implement a car grading and commodification to support national level car distribution. Evaluate the impact of customer regulations on the utilization of cars moving in international service. Evaluate the conflict between owner's equity and car utilization embodied in current and proposed freight car management systems. Initiate and freight car management experiments considered necessary. Using the information gained, recommend a nationwide freight car distribution and management system.

PERFORMING AGENCY: Association of American Railroads  
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
Wooden, DG Tel (202) 293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$300,000

ACKNOWLEDGMENT: AAR

17 159631

**RAILROAD OPERATIONS MODULAR PROCESSING SYSTEMS (ROMPS)**

The purpose of the project is to demonstrate the feasibility of a geographically shared railroad operations data processing capability oriented towards satisfying the AAR's TRAIN II information requirements as well as the basic information needs common to principally small railroads. In concept, a single hardware/software system satisfying these needs within a common geographical area would be used by those railroads which cannot economically justify computer systems for themselves. The participating railroads would be connected to a centrally located mini-computer system via a communication link for the transmission and receipt of information as

required by the system. The nucleus of the participants would be located in a common geographical area with the remainder situated throughout the country.

PERFORMING AGENCY: Association of American Railroads  
 SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
 RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
 Wooden, DG Tel (202) 293-5018  
 STATUS: Active NOTICE DATE: Feb. 1978 START DATE: June 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$700,000  
 ACKNOWLEDGMENT: AAR

#### 17 159648

##### NETPAC/2 PROJECT COST AND RESOURCE ACCOUNTING COMPUTER PROGRAM DEVELOPMENT

To produce a resource and cost accounting system for project planning and control to be added to an existing critical path time program (NETPAC/1). The program will produce 7 report classes (1) progress data (2) project cost (3) cost of work (4) cumulative cost (5) cost histogram (6) resource histogram (7) account code. The program is intended to provide reasonable accurate but timely cost and resource usage information on demand.

##### REFERENCES:

Handbook of Critical Path Law, CE; Lach, DC, Published by the Authors, 9th Printing, 1975

Project Management and Cost/Budget Control AREA Conference, Pittsburgh, Penn, 19-20 Oct 1976.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.63.76

INVESTIGATOR: Law, CE Tel (613)547-5777 Lockhart, M

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: Law, CE Tel (613)547-5777

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1967 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$4,000

ACKNOWLEDGMENT: CIGGT

ORDER FROM:

#### 17 160402

##### FAST DATA MANAGEMENT AND ANALYSIS

To provide a data management system for the Facility for Accelerated Service Testing (FAST) test data, conduct appropriate data analysis and evaluation efforts, and report the resultant conclusions. FAST data analysis and report will provide the foundation for engineers in the railroad industry to make technical and economic decisions to update and improve railroad design, maintenance, and operations practices.

PERFORMING AGENCY: Association Of American Railroads, 1920 L Street, NW

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Gray, D Tel (202) 755-1877

Contract DOT-FR-74293 (CR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$454,094

ACKNOWLEDGMENT: TRAIS

#### 17 179340

##### MODELS FOR COMPLEX SYSTEMS

This research will develop probabilistic models for complex systems. The investigation of parametrically simple models for dependent sequences of random variables will be continued. Situations represented by such models include, the sequence of access path lengths in a data base system, the number of vehicles in moderately congested traffic crossing a fixed point on a road during consecutive time intervals of fixed length; and daily river flow data. The structural and limiting results of these dependent sequences of random variables in queueing models will be studied. Finally, the processes will be investigated in a randomly changing environment.

PERFORMING AGENCY: Stanford University, School of Engineering, Operations Research

INVESTIGATOR: Jacobs, PA

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG77-09020

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1977 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$22,032

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6664)

18 059894

**STUDY OF FEASIBILITY AND IMPACTS OF ALL-INCLUSIVE TRANSPORTATION TRUST FUNDS AS A MECHANISM FOR TRANSPORTATION FINANCE**

This study will study the feasibility of designing and implementing multi-modal transportation trust funds at the Federal state and regional level. The feasibility analysis will address the following factors: 1) existing and potential funding sources at the respective levels; 2) compatibility among the funds and their levies; 3) institutional changes required to implement these funds; 4) effect on political decision-making process; and 5) flexibility to meet differing transportation needs in the various states and localities.

PERFORMING AGENCY: Polytechnic Institute of New York, Transportation Training and Research Center

INVESTIGATOR: Roess, RP Crowell, WH

SPONSORING AGENCY: Urban Mass Transportation Administration, NY-11-0014

RESPONSIBLE INDIVIDUAL: Stratton, J

Grant NY-11-0014

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: June 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: TRAIS (NY-11-0014)

18 059896

**ALLOCATION OF TRANSIT SUBSIDIES**

The objective is to develop an analytical methodology for the rational allocation of subsidies to different transit lines and modes. The proposed research makes use of a simple analytical structure for the management of transit systems. Based on the demand and cost modes, explicit expressions can be derived for any measure of equity or efficiency such as subsidy per passenger, cost per passenger mile, etc.

PERFORMING AGENCY: Princeton University

INVESTIGATOR: Lion, PM

SPONSORING AGENCY: Urban Mass Transportation Administration, NJ-11-0004

RESPONSIBLE INDIVIDUAL: Hughes, PG

Grant NJ-11-0004

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$58,062

ACKNOWLEDGMENT: TRAIS (NJ-11-0004)

18 059897

**REGIONAL FINANCING ALTERNATIVES FOR MASS TRANSIT**

The project will compare alternative regional financing mechanisms for mass transit in terms of their economic efficiency, equity, fiscal impact, locational and land use incentives, and administrative feasibility. Six alternative revenue sources will be analyzed and evaluated according to the following criteria; 1) property (and land) taxes; 2) income taxes; 3) sales taxes; 4) user charges; 5) intergovernmental grants; and 6) general revenues.

PERFORMING AGENCY: Syracuse University

INVESTIGATOR: Puryear, D

SPONSORING AGENCY: Urban Mass Transportation Administration, NY-11-0003

RESPONSIBLE INDIVIDUAL: Jasper, N Tel (202) 426-0081

Grant NY-11-0003

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$98,062

ACKNOWLEDGMENT: TRAIS (NY-11-0003)

18 080324

**THE RAILWAY FREIGHT RATE ISSUE IN CANADA**

The historical development of the railway freight rates in Canada is traced to provide the basis for explaining the complex roles played by freight rates

and their evolution from an economic function to a sociological or political phenomenon. The inhibiting effects on the development of sound transportation and regional development policies are also analysed. /RTAC/

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4,33.74

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport; Canadian National Railways; Canadian Pacific; Department of Transport, Canada

RESPONSIBLE INDIVIDUAL: Schwier, C Tel (613) 547-5777

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1974 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$45,000

ACKNOWLEDGMENT: CIGGT

18 129724

**FREIGHT CAR AND LOCOMOTIVE COSTING**

Develop a set of methodologies and procedures for use in estimating the nature of cost and its variability in purchasing, maintaining, and operating freight cars and locomotives with application to pricing control and other management purposes.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company; Southern Railway System; Reebie (Robert) and Associates, Incorporated

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel 202-426-0771

Contract DOT-FR-55055

STATUS: Active NOTICE DATE: July 1976 START DATE: June 1975 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$485,021

ACKNOWLEDGMENT: FRA

18 138514

**GENERAL AND ADMINISTRATIVE SERVICES COSTING METHODOLOGY**

To develop, test, and justify a set of methodologies and procedures to be used for estimating the economic costs of providing and maintaining railroad general administrative services and for management control and decision making.

PERFORMING AGENCY: Price Waterhouse and Company

INVESTIGATOR: Scanlan, J

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel (617)423-7330 x219

Contract DOT-FR-5167

STATUS: Active NOTICE DATE: Aug. 1978 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: FRA

18 159635

**RAILWAY COSTING ORDER REVIEW**

This work is not a stand-alone project, but consists of integrating CIGGT costing work with that of research teams assembled by the Canadian Transport Commission for the purpose of thoroughly revising railway costing order procedures.

REFERENCES:

Railway Costing Study, Phase I Report Canadian Transport Commission, Nov. 1977

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.36.77

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Schwier, C Roney, MD Turcot, MC Boon, CJ Oum, T

SPONSORING AGENCY: Canadian Transport Commission

RESPONSIBLE INDIVIDUAL: Lake, RW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: CIGGT

20 055810

**TRANSPORTATION SYSTEM DEVELOPMENT FOR ALASKA**

This project is directed at the analysis of policy and transportation system development alternatives upon the economy of the State of Alaska as well as upon the performance of the intercity freight transportation networks. A macroeconomic model, previously developed by the Brookings Institution shall be adopted for use in representing the basic structure and interrelationships of the Alaskan economy. A transportation network simulation model shall also be developed as part of this effort which includes each of the major intercity freight carrying modal systems operating or expected or be operating in Alaska.

A recent Federal Railroad Administration study used the research demand forecasting models to predict Alaska Railroad freight flows by commodity type. Rail data was also used by the Canadian government in studying the feasibility of a Canadian railroad system extension to Alaska.

PERFORMING AGENCY: Alaska University, College

INVESTIGATOR: Gorsuch, L

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Swerdloff, CN

Contract DOT-OS-40008 (CS)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1973 COMPLETION DATE: June 1979 TOTAL FUNDS: \$222,959

ACKNOWLEDGMENT: TRAIS (PR# PUR-2-30685)

20 058460

**TRANSPORTATION REQUIREMENTS FOR COAL MOVEMENTS THROUGH 1985**

Develop and analyze rail and barge industry estimates of the total coal flows by 1985 and the equipment and facilities required to handle increased coal traffic. Critical system constraints that may hinder traffic growth will be determined and carrier solutions sought. The rail and barge industry planning processes to 1985 will also be examined and discussed.

**REFERENCES:**

Rail and Water Transportation Requirements for 1980 U.S. Coal Flows, IOCS, Cambridge, Mass., Oct. 1977

PERFORMING AGENCY: Input Output Computer Services Incorporated

INVESTIGATOR: Desai, SA Tel (617) 661-8700 Witten, J

SPONSORING AGENCY: Transportation Systems Center, OP-602

RESPONSIBLE INDIVIDUAL: Maio, D Tel (617) 494-2668

Contract DOT-TSC-1282

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$155,000

ACKNOWLEDGMENT: TRAIS, OST

20 058467

**DATA REQUIREMENTS ON INTERCITY FREIGHT DEMAND PLANNING**

The objective is a critical review of present data sources and reporting methods. Emphasis is on the usefulness of the data in calibration and estimation of existing forms of demand models and recommendations on better sources or collection techniques for more effective forecasting of commodity flows. Data of primary concern are indications of shippers' choice; commodity attributes; production, consumption and pricing of commodities; and transportation attributes. A careful review of the form of the model and variables needed to predict modal choice by shippers is made. Various methods of data collection, processing, storage and retrieval and their related costs are evaluated for achieving the goals.

**REFERENCES:**

Design of a Structure and Data Analysis Scheme for Intercity Freight Demand Forecasting, Chung, C; Roberts, PO, CTS Rept. #75-15, 154 pp, Sept. 1975

A Commodity Attribute Data File for Use in Freight Transportation Studies, Samuelson, RA; Roberts, PO, CTS Rept. #75-20, 27 pp, Nov. 1975

Developing Freight Origin-Destination Data for Use in Freight Planning, Roberts, PO, CTS Rept. #76-3, Feb. 1976

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies

INVESTIGATOR: Roberts, PO Tel (617) 253-7123

SPONSORING AGENCY: Transportation Systems Center, OP-509

RESPONSIBLE INDIVIDUAL: Wright, DG Tel (617) 494-2196

Contract DOT-TSC-1005 (CR)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1975 TOTAL FUNDS: \$38,000

ACKNOWLEDGMENT: TRAIS, Massachusetts Institute of Technology

20 059189

**FORECAST OF NATIONAL ECONOMIC ACTIVITY**

The main purposes of this procurement are to obtain from the Bureau of Economic Activity (BEA) the basic data files needed to translate forecasts of national economic activity into regional projections; to obtain examples of applications of the Regional Industrial Multiplier System useful in estimating the direct, indirect and induced effects of changes in the output of an industry on a region; and to obtain research assistance in developing a sound commodity flow projection method.

PERFORMING AGENCY: Department of Commerce, Bureau of Economic Analysis

SPONSORING AGENCY: Transportation Systems Center

IA RA-76-29

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976 TOTAL FUNDS: \$10,000

ACKNOWLEDGMENT: TRAIS

20 083533

**ECONOMIC ANALYSIS OF THE UNITED STATES GRAIN EXPORTING SYSTEMS**

Evaluate private versus state trading systems for grain with respect to: Returns to producing, marketing and processing firms; relative market power between countries with different systems; comparative advantage; relative efficiencies of time, farm and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their respect to commodity futures markets. Evaluate alternative export marketing techniques and strategies with respect to: the adequacy of the U.S. system of grades and standards; the logistics of costs of marketing and transportation. Comparative data will be collected on Canadian and U.S. grain handling costs and procedures. Structural and policy differences will be compared wherever possible. System performances will be compared on the basis of handling costs and producer returns. Analysis of capital investment decisions in the two systems will also be made. Data on price quality relationships for wheat will be collected and analyzed to determine the validity of present grading factors. North Dakota production data will be assembled on a county basis for use in a transportation model designed to analyze various rate policies for west bound shipments of wheat and barley. Existing transportation rates will be used to generate optimal flow patterns. Alternative rate policies will be compared to existing rate solutions. A manuscript is in process on a study of North Dakota Farmers Grain Marketing Strategies. The major factors influencing the selection of market outlet by farmers were price, convenience, grading practices, loyalty to firm, credit provisions for purchases and availability of farm supplies. Price and availability of labor were major factors in determining timing of grain sales. A survey of country elevators designed to basic marketing strategies and to review sale and procurement practices used by a random sample of firms was initiated. This study was a part of a regional study of country elevator marketing practices. The state and regional data are being analyzed and a Master's thesis is expected to be completed in early 1976. Preliminary results indicate that country elevators make limited use of futures markets in covering grain purchases. To-arrive contracts with terminal grain merchants are the predominant method of covering long grain positions in most states. The predominant method of transfer of grain ownership is still cash purchase at delivery by farmers; however forward contracting and farming of deferred pricing and pooling arrangements are becoming popular in several states of the North Central Region.

**REFERENCES:**

The Cost of Seed Processing Anderson, DE, NDSU, Agricultural Experiment Station, Nov. 1973

Grain Marketing Methods in the United States: Theory Assumptions and Approach, Anderson, DE, NDSU, Agricultural Experiment Station, AA-EA-CAES-WAEA Conf Paper, Aug. 1973

A Budget Analysis of the Logistics System for North Dakota Small Grains, Jensen, RC, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, May 1974

North Dakota Farmers Grain Marketing Strategies Bedker, GM, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, Mar. 1974

North Dakota Farmers Grain Marketing Practices Bedker, GM; Ander-

son, DE, NDSU, Agricultural Experiment Station, North Dakota Farm Research, Oct. 1974

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND01354

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: North Dakota State University (CRIS 0060238)

20 099645

## EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniform. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

### REFERENCES:

Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing and Transportation Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

Nature and Quality of Livestock Transportation Services Used by Shippers, Hoffman, LA, Transportation Committee of American Nat'l Cuttlemen's Ass, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Conr Quality Conference, Champaign, Illinois, Oct. 1973

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S., pp 18-24

PERFORMING AGENCY: Washington State University

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-53-01-X2

Contract 12-17-04-8-917-X

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41788 46 286117)

20 099646

## EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about

for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

### REFERENCES:

Livestock, Trucking Services: Quality, Adequacy and Shipment Patterns, Hoffman, LA; Boles, PP; Hutchinson, TQ, Economic Res Service, AFR-312, Oct. 1975

Operations of For-Hire Livestock Truckers Boles, PP, Economic Res Service, AER-342, July 1976

Impact of Higher Gasoline Prices on Rural Households, Hoffman, LA, Economic Res Service, 4 pp, Apr. 1976

Discussion of a Sequential Link Approach to Evaluating Transportation Facility Adjustments, Gerald, JO, Sou. Journal of Agric Econ., V8 N1, pp 35-37, July 1976

Estimation of Demand for Transp of Agric Commod Miklius, W; Casavant, KL; Garrod, PV, Amer Journal of Agric Econ, V58 N2, pp 217-223, May 1976

PERFORMING AGENCY: Economic Research Service

INVESTIGATOR: Gerald, JO Hutchinson, TQ

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-11-00

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41660)

20 099647

## EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulations at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation

were analyzed for their impacts on agriculture.

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Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing & Trans Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

Nature and Quality of Livestock Transportation Services Used by Shippers, Hffman, LA, Transportation Com Amer Nat'l Cattleman's Ass, San Diego, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Corn Quality Conference, Champaign, Ill.

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S.

PERFORMING AGENCY: Illinois University, Urbana, USDA, National Economic Analysis Division

INVESTIGATOR: Bunker, AR

SPONSORING AGENCY: Economic Research Service, NEA-14-125-17-01

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (GY 41787), Smithsonian Science Information Exchange (CRIS 0041787)

#### 20 129727

### DOMESTIC AND INTERNATIONAL TRANSPORTATION OF U.S. FOREIGN TRADE: 1976-GENERAL CARGO COMMODITIES (PHASE II)

Objective is to obtain, (a) New Data on the domestic origins and destinations, and the characteristics of domestic transportation, for commodities being transported via international air and vessel movements in U.S. foreign trade, and (b) New data on the transshipment of this type of commodity by truck and rail between U.S. and Canada (or Mexico) for trade with other foreign countries. Data will be collected by a sample survey (50,000 observations) and merged with existing data on international trade.

Co-sponsors are St. Lawrence Seaway Development Corp., U.S. Dot; U.S. Army Corps of Engineers, Institute for water Resources, Ft. Belvoir, Virginia; Maritime Admin, Dept of Commerce, Office of the Secretary-U.S. DOT. A similar study for bulk commodities, but excluding grains and crude petroleum, is also being performed under a separate contract and managed by the IWR/CCE.

#### REFERENCES:

Domestic & Intl Transportation of U.S. Foreign Trade: 1975- Gen Cargo Commod; Phase I: Prelim Studies, Spec & Plans, Bureau of the Census

PERFORMING AGENCY: Department of Commerce, Economic Surveys Division, 63-7108

INVESTIGATOR: Torene, R Tel (202)763-5430

SPONSORING AGENCY: Office of Policy and International Affairs; Department of Transportation, Office of Intermodal Transportation

RESPONSIBLE INDIVIDUAL: Murphy, RD Tel (202)426-4448

Contract DOT-AS-50059

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1975 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$600,000

ACKNOWLEDGMENT: Office of Policy and International Affairs

#### 20 136085

### STUDY OF RADIOACTIVE MATERIAL TRANSPORT PROBLEMS 1976-2000

The aim of the project is to examine future transportation systems, trends, and problems associated with transport of nuclear fuel cycle materials, petroleum, coal & natural gas to assure a more orderly problem solving approach. Work areas included: (1) characterize the current transportation systems; (2) project future transportation needs and systems; (3) identify and analyze potential future transportation problems; (4) suggest actions to minimize impact of potential problems.

#### REFERENCES:

Identification and Prioritization of Concerns in Coal Transportation Now Through 2000, DeSteele, JG; Franklin, AL, PNL-SA-6527, May 1978

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs, RL 6617B

INVESTIGATOR: DeSteele, JG Tel (509) 946-2519

SPONSORING AGENCY: Energy Research and Development Administration

tion, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5466

Contract DOE-AT-45-1-1830

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: July 1978 TOTAL FUNDS: \$575,000

ACKNOWLEDGMENT: Energy Research and Development Administration

#### 20 138364

### EVALUATION OF ALTERNATIVE TRANSPORTATION SYSTEMS AND POLICIES FOR RURAL MISSOURI

Estimate transport requirements to 1985 and 1990. Estimate economic effects of alternative rural transport systems. Assess state and federal roles in setting transport policy and planning and regulating transport systems. Study economic effects of alternate plans and policies on carriers, shippers and rural areas. Present Missouri rural transport system will be described. Demand for services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated modal combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. 1. A study of grain production and marketing in Northwest Missouri has been completed together with a projection of transportation demand for movement of grain to 1980 and 1985, to determine a grain distribution system which would yield the highest net return to producers and marketers within the region. Study results indicate the possibility of a contribution of as much as \$2.6 million per year in farmer net income, before considering transportation and elevator upgrading costs, through adjustment of assembly and storage patterns to permit long-haul transport in larger volume shipments at lower cost. 2. A study of the condition, capacity and impediments to efficiency in Missouri's transportation system has been finalized for publication. The study documents the need for special attention to upgrading of rural roads and bridges; identifies segments of the railroad system with service limitations requiring attention; and highlights the possibilities for improved utilization of our underemployed inland waterway resources as a promising target for further study. Findings of this study have important implications for both public and private sector decision making. 3. Data collection is proceeding for estimation of transportation demand for grain and fertilizer, on a state-wide basis by counties, in 1980 and 1985.

#### REFERENCES:

Missouri Rural Transportation in Jeopardy Moser, DE, Missouri University, Extension Division, Vol. 18; No. 8, Aug. 1975

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068730)

#### 20 138365

### TRANSPORTATION MODEL OF THE GRAIN AND FERTILIZER SECTOR OF NORTHWEST OHIO

Describe the present condition of the rural transportation system in selected areas of Ohio. Estimate flow of grain and fertilizer, in selected areas of Ohio. Estimate the optimal flow of commodities between production and consumption points through the network. Trace the effects of alternative government transportation policies on the operation of the transportation system. Conduct cost-benefit analyses of alternative investments in the rural transportation system. Develop a transportation model to evaluate the impact of changes in the transportation system and government policy on the movement of agricultural commodities and future needs of the transport industry. The questionnaire for this project was finalized during spring quarter and data collection started in the summer quarter. Due to the detailed nature of the questionnaire, the number of completed, usable interviews (58) was less than desired but still adequate for the research. Data was obtained on number, size and location of grain elevators, monthly shipping pattern of corn, wheat and soybeans by transportation mode and by market destination for the 1974/1975 and 1975/76 crop years. computer runs using SAS-76 have been completed.

#### REFERENCES:

Rail Transportation Problems in Ohio Larson, DW, Ohio State University, Dept Agri Econ and Rural Soc, No. 577

The World Food Crisis: Implications for Trade and Aid Larson, DW, Ohio State University, Dept Agri Econ and Rural Soc

Recent Developments on Rail Reorganization in Ohio, Socio- Economic Information for Ohio Agri & Rural Communities, Larson, DW, No. 581, Nov. 1976

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO00534

INVESTIGATOR: Larson, DW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0067954)

## 20 138367

### NATIONAL TIMBER AND WOOD PRODUCTS REQUIREMENTS

Analyze the present and prospective consumption of timber and wood products in the national economy by components and relate these requirements to the national to the national timber supply situation. Develop and apply sampling systems to measure quantities consumed in construction, manufacturing, shipping, and other major end uses. Develop and employ accurate models which monitor shifts in wood raw materials use. Develop and apply techniques for converting wood product consumption estimates into estimates of timber supply requirements. PROGRESS REPORT: A study of nonresidential and nonhousekeeping building construction activity found it increased from 1 billion square feet in 1961 to 1.7 billion square feet in 1973. The largest increase was in commercial buildings such as stores, warehouses, and office buildings. Nonhousekeeping, hospital, and other buildings also showed increases. Construction of industrial, religious, and educational buildings declined during the period. Lumber, plywood, hardboard, and particleboard usage in these structures increased during the period, while glue-laminated lumber, insulation board, and structural wood-fiberboard decreased. Construction value for all building increased from \$16.05 per square foot of floor area in 1961 to \$24.15 in 1973--an average annual rate of 3.5 percent. A computer retrieval and compiling system has been established, containing primary wood processing mill capacity, type, and location for analysis of trends and regional patterns in timber requirements. Annual woodpulp capacity in the U.S. has increased from 4.4 to 51.5 million tons since 1920, with average mill capacity increasing nearly ten times to 426 tons per day. Kraft pulp capacity now dominates the industry with the South leading in total pulping capacity. Panelboard production capacity data have been collected.

PERFORMING AGENCY: Forest Products Laboratory, FPL-4202

INVESTIGATOR: Stone, RN Marcin, TC Reid, WH

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0042894)

## 20 138370

### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. PROGRESS REPORT: For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse

impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate service and other proposals for change in transportation were analyzed for their impacts on agriculture.

#### REFERENCES:

Effects of the Proposed Northeast-Midwest Rail Reorganization on Rural Areas, U.S. Senate, Agriculture and Forestry Comm, Mar. 1975

PERFORMING AGENCY: Kansas State University, USDA Transportation Economics Division, NEA-14-125-53-01-X1

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041974)

## 20 138376

### IMPACT OF CHANGES IN WORLD FOOD SUPPLY-DEMAND UPON SELECTED AGRICULTURAL MARKETS

Estimate input usage to achieve the projected agricultural production, considering probable price and availability of farm inputs. Determine the adaptability of the existing agricultural input market organization to meet projected changes in agricultural output (and to suggest alternative organization in case input market structure is found to be inadequate). Input usage ranges will be estimated based on technical coefficients from secondary sources: input studies, farm management budgets and LP analyses. Consideration will be given to likely changes in resources mixes. Budgeting or linear programming procedures will be used to determine expected future resource utilization rates. Production projections from secondary sources will be used in estimating total input requirements. A multiple-product (LP) cost evaluation model will be used to measure the effect of price changes on farm input retailing costs. Sensitivity analysis applied to cost coefficients will facilitate the measurements. The effects of factor and product price changes on scale, volume and product diversity economies will be measured by rerunning the LP model using alternative price assumptions. Results of the LP runs will be used to compare optimum-cost structural conditions with actual assess operational efficiency.

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-0060

INVESTIGATOR: Anderson, DG Lytle, PW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Aug. 1971 COMPLETION DATE: June 1977

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0060266)

## 20 153650

### MULTI-MODAL, MULTI-STATE TRANSPORTATION SYSTEM EVALUATION

Evaluate the feasibility of a multi-modal, multi-state corridor extending from Kansas City, Missouri to Jacksonville, Florida for the movement of goods and people.

PERFORMING AGENCY: University of North Florida, Jacksonville, Department of Transportation and Logistics, DOT-OS-60512; Georgia Institute of Technology, 225 North Avenue, NW

INVESTIGATOR: Jones, PS Tel (904) 646-2860 Smith, JA, Jr

SPONSORING AGENCY: Department of Transportation, Office of University Research; University of North Florida, Jacksonville

RESPONSIBLE INDIVIDUAL: Jones, PS Tel (404) 894-2308

Contract DOT-OS-60512

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Feb. 1977 COMPLETION DATE: May 1979 TOTAL FUNDS: \$1,000,000

ACKNOWLEDGMENT: University of North Florida, Jacksonville



20 156542

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation storage and distribution system. Evaluate the economic effects of alternative railroad ownership and financial policies. Develop models to estimate the volume of agricultural outputs and inputs requiring transportation and project to 1985 and 1990 the spatial and temporal pattern of products to be transported. With this information an optimal rural freight transportation storage and distribution system will be estimated using a time staged transshipment model of spatial equilibrium. alternative rail reorganization schemes and assess the sensitivity of the suggested transportation system to changes in the cost of alternative modes of transportation. In addition, we will inventory and describe existing ownership patterns and develop procedures to evaluate the costs and benefits of ownership alternatives and abandonment of railroad lines. Substantial progress has been made toward the completion of an estimate of the demand for rural transportation in the State of Michigan. Appropriate methodology has been developed and is currently being implemented to make demand projections to 1985 and 2000 under alternative domestic and foreign demand scenarios. Michigan State has taken a leadership role in developing appropriate methodological procedures to be used by other stations cooperating in the NC-137 regional project. Specific results will be forthcoming on projected quantities of grain requiring transportation services in the State of Michigan. In addition, we are in the initial stages of research directed toward the estimation of an optimal rural freight transportation storage and distribution system in a selected geographical region of Michigan.

PERFORMING AGENCY: Michigan State University, East Lansing, Department of Agricultural Economics, CSRS MICL

INVESTIGATOR: Thompson, SR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, MICL01254

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070878)

20 156591

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION, STORAGE, AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. Comparison of costs, rates, and services under regulated vs. unregulated conditions will provide the basis for evaluating the merits of alternative regulatory policies. A model will be constructed which will describe rural transportation systems as they would exist under alternative state and federal regulations. The likely performance of the transportation systems will be estimated as a function of the intramodal competitive environment of the participating states. A survey of area grain shippers and carriers was conducted to identify the basic procedures and policies related to ICC regulation of the railroads as they affect grain transportation. Also, opinions on the practical effectiveness of regulation and suggestions for regulatory reforms were solicited. A manuscript summarizing these surveys was prepared. Included in this manuscript is a discussion of the relationship between regulated rail rates, unregulated rates for other modes, and the economic problems confronting U.S. railroads. This manuscript will be published in the January 1977 edition of the Minnesota Agricultural Economist. Another manuscript was prepared which outlines the essential arguments surrounding the Lock and Dam No. 26 replacement controversy. This work centered its attention on the relationship between the economic, environmental, and natural resource value of the Mississippi River. This was viewed in terms of the impact of Lock and Dam No. 26 on these issues. This manuscript will be a portion of an aggregated article on agricultural policy perspectives for 1977 which will appear in the February 1977 issue of the Minnesota Agricultural Economist.

**REFERENCES:**

Railroad, Grain Transportation and the Interstate Commerce Commission, Martin, M; Dahl, R, Minnesota Agricultural Economist, Jan. 1977

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, CSRS MIN

INVESTIGATOR: Dahl, RP Tel (612) 376-3436 Martin, MV

SPONSORING AGENCY: Department of Agriculture, MIN-14-043; Minnesota University, St Paul, Department of Agricultural and Applied Economics

RESPONSIBLE INDIVIDUAL: Dahl, RP Tel (612)376-3436

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Oct. 1981 TOTAL FUNDS: \$6,200

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071288), Minnesota University, St Paul

20 156604

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

The project will: estimate rural freight transportation requirements to 1985 and 1990, estimate the optimal rural freight transportation, storage and distribution system; evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. The present rural transport system will be described. Demand for transportation services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated model combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. Project activated October, 1976. Proceeding with collection and processing of data for estimation of production and flow patterns for transportable surplus of grain, and for transportation demand for movement of grain and fertilizer.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, CSRS MO

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, M000040-1

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070255)

20 164822

**ONTARIO FREIGHT MODEL**

The design of this model will meet the following specific objectives: The development of an understanding of commodity movements and factors influencing commodity movements to and from, through and within the Province of Ontario; assistance to the planning of capital improvements to the transportation network; the provision of data and expertise to assist in the development policy for the regulation of movements on the transportation network; the production of a tool to aid in the effective operation of the existing system. The project is divided into 8 phases: (1) Review of Data and Existing Work, (2) Selection of Commodities, (3) Determination of Functional Relationships, (4) Definition of the Network, (5) Model Development and Timing, (6) Model testing, (7) Monitoring model usage, and (8) Model review. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can

INVESTIGATOR: Kher, R

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Active NOTICE DATE: Dec. 1976 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 179664

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990 and estimate the optimal rural freight transportation, storage and distribution system. Historical data on agricultural production and input usage by Texas subregions will be gathered. Models will be developed to provide estimates of agricultural output and input usage by subregion to 1985 and 1990. With this data, spatial and temporal flow patterns of agricultural products and inputs will be estimated. Transportation cost and rate data will be gathered by mode as it relates to projected agricultural output and input flows. With



supply and demand estimates and storage, processing and transportation costs, normative spatial and temporal flows will be resolved with spatial equilibrium models. Optimal number, size and location of storage, processing and distribution facilities will be resolved. The social and economic costs and benefits with alternative configurations will be evaluated.

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics, TEX03376

INVESTIGATOR: Fuller, SW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070225)

20 179665

## EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990. Develop models which will provide uniform estimates of agricultural output and input usage by state to 1985 and 1990. Collect historical data on agricultural production and input usage of commodities and states. Project spatial and temporal pattern of outputs and inputs to be transported. Develop procedures for estimating and estimate elasticities and cross elasticities of demand with respect to price and service, by mode of transport and commodity group. The analysis would include the response of individual firms to price and service changes in transportation as well as aggregate response relationships.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01648

INVESTIGATOR: Johnson, MA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071995)

20 179666

## EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEM

To estimate rural freight transportation requirements to 1985 and 1990. To estimate the optimal rural freight transportation, storage and distribution system. To evaluate the economic effects of alternative railroad ownership and financial policies. Steering committees for each objective will be appointed from participants cooperating in each objective. The purpose of these committees will be to coordinate research methodologies and to provide for data sharing. Joint publications summarizing regional findings are planned. Historical production data by counties has been collected for major crops, livestock and fertilizer during the 1960 and 1975 period. National projections will be used in conjunction with this data to project rural freight transportation requirements to 1985 and 1990.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO00572

INVESTIGATOR: Larson, DW Tel (614) 422-6731

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071704)

20 179667

## EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal grain transportation, storage, and distribution system which can maximize farmers' benefits. Evaluate the economic effects of alternative railroad ownership and financial policies. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural commodities. Objectives 1, 2, and 3 will be completed by using a multi-stage transportation model. This model is based

on a combinational algorithm, which compares alternative grain distribution systems and selects the optimal configuration. Interregional mathematical programming models are applied for Objective 4. This programming model determines the amount and directional flows of grain between producing and consuming regions. Completion of developing both plant location model and linear programming model. Completed the estimation of truck and barge costs for grain shipments. Completed a mileage matrix from 172 shipping points to domestic and export markets. Grain sale estimation for 1985, 1990 and 2000 will be completed. Subterminal investment cost, rail line upgrading cost and multiple car cost will be estimated.

### REFERENCES:

Shipment Patterns of Montana Wheat and Barley Under Alternative Rail and Truck-Barge Rate Structures, Koo, WW; Cramer, G, Montana State University, Staff Paper 76-26

Shipping Patterns of Montana Grain Koo, WW; Cramer, G, NOW, Agricultural Experiment Station, Montana State Univ

A Study of the Interaction of Weather with Alternative Environmental and Grain Reserve Policies, Koo, WW; Bogges, WG; Heady, EO

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB00077

INVESTIGATOR: Koo, WW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071118)

20 179671

## INTERMODAL TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER

Estimate adjustments required in facilities and operations to enable barge transportation to perform its optimal role in transportation of grain and fertilizer in the Mississippi River basin in 1985. Develop data on estimated fertilizer usage and exportable grain production in Missouri to 1985. Participate with Iowa State University and NC-137 contributors in Projection of Mississippi River basin usage of fertilizer and production of exportable grain surpluses to 1985. Develop and evaluate data on number, location and capacity of river ports, barge lines, transfer facilities and fleet and switching services for grain and fertilizer on the Mississippi River system. Determine structural and procedural adjustments needed to minimize cost of barge transportation and handling of grain and fertilizer on the Mississippi River System. Participate with Iowa State University and Louisiana State University in estimation of intermodal allocation of fertilizer and grain traffic to minimize costs of transporting quantities of these commodities expected to move through deepwater Mississippi River ports by 1985.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040-2

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072803)

20 179678

## ECONOMIC PROJECTIONS PROGRAM

Synthesize technical and economic data and relationships into component models of the ERS National Interregional Agricultural Projections (NIRAP) System. Coordinate ERS-wide projection teams for evaluating and making necessary modifications in the NIRAP System and resulting projections and document all components and interrelationships in a User's Manual. Generate projections and analysis of alternative futures encompassing major variables in the U.S. food and fiber system and its input supply, farm production, transportation, processing and distribution subsectors. Disseminate information via staff reports, professional papers, technical bulletins and a publication, Agriculture the Third Century. "First generation" component models for essential technical and economic relationships will be followed by additional first generation components and "second, third and more advanced generation" modified components to expand ERS's capability to simulate alternative futures more useful in economic

research, public policy formulation and program planning and administration. Eleven scenarios were developed for a study for Resources for the Future. Alternative growth rates in GNP and population were combined with moderate and high trade, current trends and stringent environmental controls, and moderate and high technology growth rates to project 31 commodities at the farm level to 1985, 2000, and 2025. The most difficult case combined high population, high GNP growth, stringent environmental controls, high trade, and moderate technological growth, then environmental controls were eased, GNP and population growth slowed, technology growth slowed, technology growth accelerated, and plant protein substituted for animal protein in other scenarios to evaluate their ability to ease resource requirements. Output consisted of aggregate prices received and prices paid by farmers, gross farm income, production expenses, net farm income, indexes of total farm output, livestock & crop production, exports and imports, food use, feed use, per capita consumption, and prices. Crop yields, land use, inputs such as fertilizer and fuel, and regional distribution were also projected.

PERFORMING AGENCY: Michigan State University, East Lansing, Division of Economics and Statistical Analysis, NEA-19-165-26-01-X

INVESTIGATOR: Rosmiller, E

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1974 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-004-3559)

## 20 179679

### EVALUATION OF ALTERNATIVE TRANSPORTATION SYSTEMS AND POLICIES FOR RURAL MISSOURI

Estimate transport requirements to 1985 and 1990. Estimate economic effects of alternative rural transport systems. Assess state and federal roles in setting transport policy and planning and regulating transport systems. Study economic effects of alternative plans and policies on carriers, shippers and rural areas. Present Missouri rural transport system will be described. Demand for services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated modal combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. A study of grain production and marketing in Northwest Missouri has been completed, together with a projection of transportation demand for movement of grain to 1980 and 1985, to determine a grain distribution system which would yield the highest net return to producers and marketers within the region. Study results indicate the possibility of a contribution of as much as \$2.6 million per year in farmer net income, before considering transportation and elevator upgrading costs, through adjustment of assembly and storage patterns to permit long-haul transport in larger volume shipments at lower cost. A study of the condition, capacity and impediments to efficiency in Missouri's transportation system has been finalized for publication. The study documents the need for special attention to upgrading of rural roads and bridges; identifies segments of the railroad system with service limitations requiring attention; and highlights the possibilities for improved utilization of our underemployed inland waterway resources as a promising target for further study. Findings of this study have important implications for both public and private sector decision making. Data collection is proceeding for estimation of transportation demand for grain and fertilizer, on a state-wide basis by counties, in 1980 and 1985.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068730)

## 20 179692

### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate private versus state trading systems for grain with respect to: Returns to producing, marketing and processing firms; relative market power between countries with different systems; comparative advantage; relative efficiencies of time, farm and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their respect to commodity futures markets. Evaluate alternative export marketing techniques and strategies with respect to: the adequacy of the U.S. system of grades and standards; the logistics of costs of marketing and transportation. Comparative data will be collected on Canadian and U.S. grain handling costs and procedures. Structural and policy differences will be compared wherever possible. System performances will be compared on the basis of handling costs and producer returns. Analysis of capital investment decisions in the two systems will also be made. Data on price quality relationships for wheat will be collected and analyzed to determine the validity of present grading factors. North Dakota production data will be assembled on a county basis for use in a transportation model designed to analyze various rate policies for west bound shipments of wheat and barley. Existing transportation rates will be used to generate optimal flow patterns. Alternative rate policies will be compared to existing rate solutions. Work was completed on a study of North Dakota Farmers Grain marketing strategies. This study indicated the principal factors influencing farmers market selection were price and market convenience. A paper was prepared and presented at the NC-104 research symposium held in Chicago in September 1976. This presentation summarized some of the research findings of a study on grain title transfer arrangements conducted by eight states in the North Central Region. The study indicated that there are significant differences among elevators in the region with respect to business procedures and marketing practices. New work initiated under this project includes a comparative study of the U.S. and Canadian grain handling systems. This study will compare policies and marketing practices of North Dakota and Manitoba. A study was also initiated to evaluate grade standards and basic quality considerations in spring wheat. It will evaluate price quality relationships to determine economic significance of selected quality factors in spring wheat.

#### REFERENCES:

Grain Marketing Strategies of North Dakota Farmers Anderson, DE; Bedker, G, North Dakota Agricultural Experiment Station, Dept Agri Econ, Report No. 111, Dec. 1975

Grain Title Transfer Arrangements in the North Central Region. Presented at NC104 Grain Marketing Sem Sept 8, 1976, Anderson, DE, North Dakota Agricultural Experiment Station, Dept Agri Econ, 1976

Abstract of Research Results-NC-104-Systems Analysis of the Economics of Grain Marketing, Stroup, J, Ohio Agricultural Research and Development Center, Wooster, Sept. 1976

Analysis of Grain Title Transfer Arrangements Fisher, N, North Dakota State Univ, Dept of Agricultural Economics, MS Thesis (unpublished)

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0060238)

21 129729

## RAILROAD YARD OPERATIONS COSTING METHODOLOGY

To develop, test, and justify a set of methodologies and procedures to be used for estimating the cost of providing, maintaining, and operating Yards and Terminals and their application to pricing, control, investment and other management purposes.

PERFORMING AGENCY: Haskins and Sells; Seaboard Coast Line Railroad; Whitten (Herbert O) and Associates

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel 202-426-0771

Contract DOT-FR-65135

STATUS: Active NOTICE DATE: July 1976 START DATE: June 1976 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$482,299

ACKNOWLEDGMENT: FRA

21 138527

## CHICAGO TERMINAL PROJECT

To increase the reliability, speed and efficiency of car movements through a major existing railroad terminal so that the quality and saleability of rail transportation is improved, thereby attracting additional traffic improving employment opportunities. The improvements are to be made without capital expenditures. This objective is being achieved through a series of experiments involving changes in operating practices, labor agreements, rates, and regulations.

Co-sponsors include Railroad Labor Organizations, Association of American Railroads and Chicago Railroad Terminal Information System.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

INVESTIGATOR: Adamson, E McGuire, T

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202)472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: July 1979 TOTAL FUNDS: \$495,000

ACKNOWLEDGMENT: FRA

21 157598

## HOUSTON TERMINAL PROJECT

The purpose is to establish a cooperative railroad labor-management experimental program for the Houston Railroad Terminal. The Houston terminal continues to experience significant car delays. Therefore, the principal objective of this project is to improve the efficiency of rail terminal operations in the Houston area.

Additional funding provided by railroad labor organizations and Houston, Texas, area Railroads.

PERFORMING AGENCY: Task Force on Rail Transp of the Labor/Mgmt Comm, Federal Railroad Administration

INVESTIGATOR: Joiner, D Tel (713)224-3662 Dessens, F Tel (713)224-3662

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Unions

RESPONSIBLE INDIVIDUAL: Collins, DM Federal Railroad Administration Tel (202)472-7280

Contract DOT-FR-75244 (CC)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$195,000

ACKNOWLEDGMENT: FRA

21 157902

## INTERMODAL FREIGHT SERVICES EAST OF THE HUDSON RIVER

The objective is to improve rail freight connections with truck and marine operations in the New York City and Long Island areas. In addition to New York City, the Long Island counties of Nassau and Suffolk will be involved in the study.

Announcement of this study was published in Traffic World, V 171, N 1 (July 4, 1977), P 18.

REFERENCES:

Transportation Priorities in New York State 1978

1978 Winter Storm Operations of the Long Island Railroad 1978

PERFORMING AGENCY: New York City Planning Commission, New York City Department of City Planning; New York State Department of Transportation, Planning Division

SPONSORING AGENCY: New York State Legislature

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 TOTAL FUNDS: \$400,000

21 159624

## FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II

As freight car utilization is a nationwide problem beyond the ability of a single railroad to solve, a cooperative research program (Phase I) between the railroad industry and the Federal Government was started in 1975 and completed in 1977. The second phase of this program will oversee the establishment and conduct of six different task forces to address and overcome those critical facets of the freight car utilization problems identified in Phase I. These task forces will structure case studies and demonstration programs which will facilitate the adoption of improvements throughout the industry. Each group will address a different facet of the utilization problem to include management organizations and practices, utilization impacts of railroad operating plans, railroad customer coordination, nationwide freight car management, railroad freight car distribution, and utilization impacts of freight car design and serviceability. All will emphasize the need for explicit adoption of systems which respond to the need to more actively and integrally manage the car fleet.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$2,388,420

ACKNOWLEDGMENT: AAR

21 159626

## FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 2. UTILIZATION AND SERVICE RELIABILITY IMPACTS OF OPERATING PLANS

Identify those operating practices which most directly impact utilization or service reliability. Needed mechanisms to initiate change will be developed. Theoretical work coupled with demonstration project will be used to define those strategies which best integrate operating decisions. Physical and financial changes resulting from the implementation of hourly car hire will be measured. Major elements of existing labor rules will be analyzed as they relate to the relationships between operating plans and car utilization. Continue previous analysis of the car cycle.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202)426-2920 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$370,000

ACKNOWLEDGMENT: AAR

21 159627

## FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 3. UTILIZATION IMPACTS OF CUSTOMER-RAILROAD RELATIONSHIPS

Improved rail-customer coordination is necessary for many strategies to improve freight car utilization. Car studies will be developed quantifying the impact which specific customer practices have on railroad service and fleet utilization. Initiate studies designed to reduce the number of cars needed in specific assigned pools. Develop a theoretical framework which permits an explanation of potential improvements in car distribution efficiency through demand levelling. Define additional strategies to improve rail-customer coordination.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$265,000

ACKNOWLEDGMENT: AAR

#### 21 159638

##### FEASIBILITY-ANALYTIC LINE CAPACITY MODEL

This project extends the available analytic models of rail lines to improve their capability to predict the capacity of a line. These models are described in "the railcar network model", edited by E.R. Petersen and H.V. Fullerton, CIGGT Rpt. No. 75-11, in RRIS Bulletin 7701, 21 141124.

##### REFERENCES:

Capacity of a Single Track Railway Line Queen's University, School of Business, Working Paper 77-38

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.73.76

INVESTIGATOR: Petersen, ER Tel (613) 547-3109

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: Law, CE Tel (613) 547-5777

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Jan. 1978 TOTAL FUNDS: \$4,500

ACKNOWLEDGMENT: Queen's University, Canada

#### 21 159653

##### INTERMODAL SYSTEM DEMONSTRATION

Test and demonstrate new concepts in intermodal services on designated routes. The AAR will subcontract with railroads through competitive bidding and will provide management to monitor and coordinate demonstrations. It will also collect and analyze data and make a final report. Among techniques to be tested are piggyback trains providing direct origin-to-destination service without intermediate yarding; scheduled services with two or more departures daily, increased labor productivity; improved terminal connections; and specialized information and control systems to respond to market changes.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: Minger, WK Tel (202) 293-5323

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1977 COMPLETION DATE: 1980 TOTAL FUNDS: \$1,300,000

#### 21 160397

##### SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEM

The Federal Railroad Administration (FRA) is involved in a substantial program to stimulate the development of rail/highway/marine and other types of intermodal freight service. The distinguishing characteristic of this type of service is the sequential transport of sealed containers of freight by both the rail and other modes. Presently, the containers are either entire highway trailers or demountable containers of similar dimensions designed for both maritime and overland transportation.

PERFORMING AGENCY: Kearney (AT) and Company Incorporated

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Blanchfield, JR Tel (202) 426-0808

Contract DOT-FR-748-4336 (FFP)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$249,988

ACKNOWLEDGMENT: TRAIS

#### 21 160398

##### SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEM

The Federal Railroad Administration (FRA) is involved in a substantial program to stimulate the development of rail/highway/marine and other types of intermodal freight service. The distinguishing characteristic of this type of service is the sequential transport of sealed containers of freight by both the rail and other modes. Presently, the containers are either entire highway trailers or demountable containers of similar dimensions designed for both maritime and overland transportation.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Blanchfield, JR Tel (202) 426-0808

Contract DOT-FR-749-4273 (FFP)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$250,000

ACKNOWLEDGMENT: TRAIS

#### 21 170596

##### NETWORK FREIGHT FLOW

The project has two main thrusts: (a) railcar blocking and train scheduling models and (b) traffic assignment with elastic demand. Both investigations rely on the technique of formulating a large scale problem as a number of subproblems. Under (a) above, these are formulated as a set of dynamic programming/shortest path problems, and under (b) as a set of linear complementary problems.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Magnanti, TL

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Crosby, RW Tel (202) 426-9638

STATUS: Programmed NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: DOT

#### 21 170620

##### RAILROAD CLASSIFICATION YARD DESIGN METHODOLOGY STUDY

This research is to establish a set of practical guidelines, procedures, and principles which will facilitate the process of classification yard design and engineering. Phase I includes preparation of a basic methodology in preliminary form. In Phase II these procedures will be applied to a case study involving a cooperating railroad. The third phase will comprise refinement and expansion of the preliminary methodology, and documentation in a user-oriented form.

PERFORMING AGENCY: SRI International, 6364-1

INVESTIGATOR: Wong, PJ Tel (415) 326-6200 X2104

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Hopkins, JB Tel (617) 494-2023

Contract DOT-TSC-1337

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Oct. 1980 TOTAL FUNDS: \$428,000

ACKNOWLEDGMENT: TSC, FRA

#### 21 170622

##### ST. LOUIS TERMINAL PROJECT

This project is an expansion of the original St. Louis Terminal Project. The original pilot project involved the St. Louis terminal of the Missouri Pacific Railroad. With the success of this pilot, the involved parties expanded the Task Force concept of experimentation to include the entire St. Louis Terminal. The gist of the Task Force concept is to create a mechanism whereby labor and management can work in cooperation to solve mutual problems. As the original St. Louis Project has shown, significant improvements in operating efficiencies can be brought about if the proper labor-management environment is produced.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract 75232

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976 COMPLETION DATE: May 1979 TOTAL FUNDS: \$300,000

ACKNOWLEDGMENT: FRA

#### 21 170664

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III: TASK 3--TRAIN OPERATION AIDS

This task will develop computer-assisted train operation and makeup aids to improve current system safety and reliability without significant hardware changes and take advantage of rapidly developing microprocessor technology. The subtasks: (3.1) Determine the manner in which an on-board

computer can interface with operating personnel to assist in safe train operation; (3.2) Develop the technical requirements for reliable on-board microprocessor systems to help monitor/control conditions on locomotives and in the train; (3.3) Identify the sensor systems with the best near-term potential for use in future on-board monitoring and train signal and control systems; (3.4) Use locomotives in FAST test service at Pueblo to obtain early experience with on-board computer-assisted operations; (3.5) Develop a yardmaster's minicomputer to optimize train makeup based on delivery efficiency and dynamic stability.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Ambrose, WG Tel (312) 567-3649

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

22 059960

**POLICY SENSITIVE FREIGHT MODEL DEVELOPMENT**

This effort will support the development and testing of disaggregate, behavioral models of intercity freight demand which can be used for the analysis of a wide range of Federal policy and program options. The proposed model must allow the Federal Government to address a wide spectrum of policy, program legislative and regulatory issues. The model should permit examination of the effects of mode specific development, pricing, technology, and deregulation alternatives upon the shipper decisions regarding the selection of transportation alternatives and be able to estimate national flows of freight by commodity and geographic detail.

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies, 84778

INVESTIGATOR: Roberts, PO Tel (617) 253-7123

SPONSORING AGENCY: Office of Policy, Plans and International Affairs; Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Swerdloff, CN Tel (202) 426-4163

Contract OS-70006

STATUS: Active NOTICE DATE: Mar. 1977 START DATE: Jan. 1977 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$292,584

ACKNOWLEDGMENT: Massachusetts Institute of Technology

22 080323

**DEVELOPMENT OF A MATHEMATICAL MODEL OF THE FREEZING OF BULK MATERIALS DURING RAIL TRANSPORTATION**

When moist materials E.G. copper and zinc concentrates coal are transported in railcars during winter, freezing of the material in the car can occur. This freezing can make the cargo difficult to discharge in order to evaluate means of over coming the problem, it is important to be able to predict the extent of the freezing that will occur under a particular set of circumstances. The purpose of the present study is, therefore, the development of a simple numerical model that will allow such a prediction to be made. A series of computer models for various types of car, have, therefore, been developed and are being used to study the effect of various parameters on the degree of freezing. A supporting laboratory program has also been undertaken.

**REFERENCES:**

A Numerical Study of Freezing and Thawing of Bulk Materials During Rail Transportation, Oosthuizen, PH; Rush, CK, ASME, 75WA/HT-87, Nov. 1975

Freezing Problems During Rail Transportation, State-of-the-Art Study. Part 1, Colijn, H, Canadian Institute of Guided Ground Transport, Report 72-13, July 1972

Field Survey Study, Freezing Problems During Rail Transport Colijn, H, Canadian Institute of Guided Ground Transport, Report 76-12, Nov. 1976

A Numerical Evaluation of the Proposed Thunder Bay Thaw Shed, Oosthuizen, PH, Canadian Institute of Guided Ground Transport, Report 77-3, Apr. 1977

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 3,49.76

INVESTIGATOR: Oosthuizen, PH Tel (613) 547-5777 Rush, CK

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: English, GW Tel (613) 547-5777

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: May 1974 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$9,660

ACKNOWLEDGMENT: CIGGT

22 083483

**ECONOMIC ANALYSIS OF THE UNITED STATES GRAIN EXPORTING SYSTEMS**

Evaluate alternative inventory and export policies with respect to: Market efficiency, price stability, producer and consumer utility, their effects on private state trading systems, servicing the export markets, and the effects of export embargoes on prices and market share. Use historical data to estimate and project demand and supply imbalance in world grain trade. Calculate the variability in supply and demand and surplus and deficits under alternative assumptions of world production and consumption. Develop models that will show the effects of alternative inventory policies on the size and variability of world grain surplus or deficit. Estimate the effects of alternative inventory policies on farm income, U.S. and world grain prices, and the variability of grain marketing firms. Estimate the costs and other economic effects of alternative policies and alternative ownership

arrangements for given levels of inventory. Estimate the relationship between alternative inventory policies and volume and destination of exports. Further work was done on a study of grain marketing patterns by Indiana farmers. A survey of truck shipments of grain by Indiana country elevators for the 1973-74 marketing year was tabulated and preparation of a manuscript for publication was begun. Truck shipments accounted for 64 percent of total grain handled by country elevators in 1974-75, up from 58 percent in the 1968-69 marketing year. This was a continuation of a long time trend. A manuscript was prepared summarizing the results of a study of vertical coordination in cooperative grain marketing systems.

**REFERENCES:**

Vertical Coordination in Cooperative Grain Marketing Systems, Schwartz, DR, Purdue University, Unpublished PhD Thesis, 1974

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND01732

INVESTIGATOR: Jones, BF

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Purdue University (CRIS 0060205)

22 083506

**DETERMINE COSTS FOR DIFFERENT SYSTEMS FOR MARKETING POTATOES FROM THE GROWER TO THE RETAIL STORE**

Develop the least cost system(s) for handling, distributing, storing, processing and packaging potatoes by improving the efficiency for each function in the marketing systems. Establish the cooperation of growers, packers, processors, wholesalers, retailers and transportation firms to participate in the study. Run test shipments from the producing areas to the retail store level. Make industrial engineering studies, economic analyses and cost evaluation comparisons to determine the optimum system(s) for marketing potatoes. It will be necessary to enlist the aid of Federal and State agriculture extension personnel, land grant colleges, potato associations and the knowledge of other laboratories within the Agricultural Marketing Research Institute. This research has been divided into three phases. The first included harvesting, loading the truck, transporting from field to packinghouse, and unloading. This phase has been completed and published. The second phase includes packinghouse operations and an MRR entitled "Operating Costs In Four Potato Packing Plants" is now edited and ready for camera copy. This study shows packing plant costs ranged from \$0.971 to \$1.027 per 50 pounds packed in 5 or 10 pound consumer bags and labor production ranged from 709 to 1,131 pounds per man-hour. The third part includes movement of potatoes from the packinghouse, to wholesale receiver and retail store. Studies were conducted on transporting potatoes by truck from the packinghouse to a wholesale receiver both handstacked and unitized. Research will be conducted on other methods of unitization. Research is also being conducted to determine costs for various systems in wholesale warehouses and retail stores.

**REFERENCES:**

A Cost Evaluation for Two Systems of Handling Bulk Potatoes from Field to Packing Shed, Volz, MD; Anthony, JP, Jr; Mongelli, RC, Oct. 1974

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15842-001

INVESTIGATOR: Volz, MD Anthony, JP Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1973 COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040246)

22 083511

**IMPROVED SYSTEMS FOR SHIPPING AND HANDLING GROCERIES FROM MANUFACTURER TO WHOLESALE WAREHOUSE**

Measure the cost for less-than-truckload (LTL) shipments of groceries from manufacturer to wholesaler and determine feasibility of reduced cost with a regional warehouse to store products of several manufacturers and ship full truckloads of grocery products from several manufacturers. Determine extent of less-than-truckload (LTL) receipts of grocery products at wholesale warehouses, measure labor productivity, detention charges, and other costs for LTL shipments. Develop a model based on actual productivity in receiving utilized truckloads of groceries, intermediate warehousing and transportation costs. Enlist the support and cooperation of the National

American Wholesale Grocers Association, National Association of Food Chains, and Super Market Institute. Data were obtained from 129 food warehouse operators concerning truck receipts of grocery products. The typical warehouse received 60 percent of its groceries by carrier truck, 30 percent by railroad, and 10 percent by backhaul. Of carrier truck arrivals, 60 percent were full truckloads and 40 percent were less-than-truckload. The typical firm had received only 10 percent of its carrier truck receipts in unitized form although 92 percent of the firms had received products that were unitized on pallets and 28 percent had received products on slipsheets. Standard productivity in unloading trucks by handstacking cases on pallets and removing the unit load with a pallet jack averaged 5 tons per man-hour compared with 59 tons per man-hour for unloading unitized products. Efficiency of truck receiving can be improved by use of the following principles: (1) Schedule incoming truck receipts; (2) specific unitized loads when ever possible; (3) provide sufficient temporary storage area; (4) keep temporary storage clear as much as possible; and (5) provide proper type and quantity of materials handling equipment.

## REFERENCES:

Methods for Receiving Groceries by Truck Bouma, JC, Nat American Wholesale Grocers' Assoc, Chicago, Proceedings, Mar. 1975

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15864-001

INVESTIGATOR: Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Nov. 1973 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040668)

## 22 083516

## CONTROL OF DAMAGE AND LOSS IN DISTRIBUTION

Find characteristics of commodities and items which are damaged in distribution, determine environment factors causing damage, propose methods of damage reduction and develop an economics of distribution loss control. Procure damage histories for specific commodities and items. Analyze package systems used in connection with damage history in the laboratory and in the field. Using established design procedures, redesign packages to reduce loss. Establish total economic advantages in use of redesigned package including resource use and the ecological impact. Using information assembled in case by case approach, establish generalities relating to damage control. Develop sub-projects to explore specific problems in the areas of cushion properties, distribution environment, item fragility and system evaluation procedures. Conducted free-fall drop test experiments to determine the effect of different container materials and impacting surfaces on shock levels. Evaluated the accuracy of different techniques used to measure velocity change. Determined the free-fall drop height equivalents of shock machine drop heights for a specific product-/package combination.

## REFERENCES:

A Critical Analysis of Vibration Measurement of the Transportation Environment, Hausch, JR, Michigan State University, School of Packaging, Tech Rpt 23, Sept. 1975

The Correlation of Shock with Free-Fall Drop Height Chatman, RS; Goff, JW, Michigan State University, School of Packaging, Technical Report 24, Aug. 1976

PERFORMING AGENCY: Michigan State University, East Lansing, School of Packaging, MICL 03108

INVESTIGATOR: Goff, JW

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1971 COMPLETION DATE: July 1999

ACKNOWLEDGMENT: Michigan State University, East Lansing (CRIS 0060632)

## 22 099624

## IMPROVING TRANSPORT AND HANDLING OF CONCENTRATED FORAGE PRODUCTS TO OVERSEAS MARKETS

Develop and evaluate improved methods and equipment for transporting and handling overseas shipments of concentrated forage products. Evaluate present forms and methods of concentrating forage products, and handling, storing, transporting and using the products. Determine how these steps interface and the effect of such interfacing. Develop improved equipment and

techniques or modifications of present technology. Evaluate improvements in commercial shipping experiments to overseas markets. Determine comparative handling and transport efficiencies in terms of physical performance and costs. Recommend best equipment and methods and develop guidelines for their use. Data collected from an experiment in a laboratory cold room indicates: (1) Use of a high volume blower to move air through a small number of palletized boxes of cherries decreases the amount of time required to cool; (2) location of the blower on top of the row of pallets or at the end of the row does not significantly change rate of cooling; (3) location of boxes within the pallet units influences the rate of cooling; and (4) moisture loss in cherries may be a problem at certain locations within the pallet load. Efforts will continue to develop techniques to properly precool packed and unitized boxes of cherries prior to shipment.

PERFORMING AGENCY: Agricultural Research Service, Western Region Oregon-Washington Area

INVESTIGATOR: Fountain, JB

SPONSORING AGENCY: Department of Agriculture, 5805-15880-001

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1973 COMPLETION DATE: Nov. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040669)

## 22 099636

## ECONOMICS OF CONSUMPTION, DISTRIBUTION, AND PRODUCTION OF SECONDARY MANUFACTURED WOOD PRODUCTS

Improve the efficiency of performance of the markets for secondary manufactured wood products in Eastern United States in satisfying the needs of society and using available resources effectively. The major research will be concerned with the pallet, furniture, and flooring industries. Studies will seek to determine the optimum raw material mix. Industrial trends and consumer preferences will be studied. Wooden pallet standards will be developed. Studies will be made to develop a model for optimizing the flow of pallets to meet the demands for shipment, handling and storage of product. This will include evaluation of a pallet exchange pool. Other studies will be concerned with developing alternatives to the labor intensive nature of the production of many wood products. The two requirements of a successful pallet exchange system are guaranteed uniform-valued pallets and an agency to provide the guarantee to the pallet user. Pallet construction standards have been written and tested that insure that species and grades are compatible with the fastening system and that pallet production procedures assure uniform performance. The design objective is uniform performance in service, irrespective of the materials used. The grading and utility-rating standard establish uniform shock-performance classes; and account must be taken in design of the differences between the classes in order to build pallets that perform in a uniform manner. To insure equal quality in a pallet exchange program, the pallets should be produced and procured under the auspices of a third-party inspection and certification system. This third party would also be responsible for maintaining the value of the pallet during its life and managing the exchange pallet inventory. The time appears right for the establishment of a major pallet exchange program in the U.S.

## REFERENCES:

Required Pallet-Research: Economic Aspects Opportunities for Virginia's Pallet, Industry, Proceedings, Wallin, WB, VPI & State University, 121, pp 32-38, 73

The Performance of Wooden Pallets in Pallet Exchange Programs, Sardo, WH, Jr; Wallin, WB

Quality Distribution of Pallet Parts From Low-Grade Lumber Large, HR; Frost, RE, USDA Forest Service Research, Paper NE-266, 6pp, illus, 1974

Factors Influencing the Selection of State Office Furniture Anderson, RB, USDA Forest Service Research, Paper NE-266, 6 pp, illus., 1973

Factors Affecting the Use of Hardwood Flooring in Urban Rehabilitation, Nevel, RL, Jr, USDA Forest Service Research, Paper NE-273, 7 pp, illus., 1973

Design of Pallet Deckboard-Stringer Joints Part II: Reinforced Aspen Pallet Joints and Aspen Pallets, Stern, EG, VPI and State Univ, Wood Res & Wood Constr Lab, Bulletin 133, 24 pp, 1975

Recent Pallet Fastening Research can Reduce Pallet Costs, Stern, EG, VPI & State Univ., Wood Res & Wood Constr Lab, Bulletin 128, 8 pp, 1974

Tentative Nailing Standards for Warehouse and Exchange Pallets, Wallin, WB; Stern, EG, VPI & State Univ., Wood Res & Wood Constr Lab, Bulletin N129, 16 pp, 1974



PERFORMING AGENCY: Northeastern Forest Experiment Station

INVESTIGATOR: Martens, DG

SPONSORING AGENCY: Department of Agriculture, NE-4304

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Sept. 1967 COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0023183)

#### 22 099639

##### SYSTEMS FOR MARKETING BEEF FROM SLAUGHTERHOUSE TO RETAIL FOOD STORE

Determine costs for various systems of marketing beef from slaughterhouse to retail food store and to develop improvements in these systems or develop a composite of two or more systems that would reduce marketing costs. Leadership will be provided by the Market Operations Research Laboratory. The objective will be met by detailed cost studies of 11 different systems for marketing beef. Cost data will be gathered from 16 firms including slaughterers, packers, central processors, and retail stores. Data gathered will include transportation methods and cost, labor cost and productivity, cutting losses, product shrinkage, description of methods, and other pertinent information. Most information will be based on company records with labor costs verified by time studies. Upon completion of data gathering, an analysis will be made to determine the most efficient system. Following this, field tests will be implemented to verify findings as to the system that appears to hold the greatest potential for cost reduction.

A study was initiated to compare the costs of two systems for handling prefabricated cuts of beef between the wholesale chain warehouse and retail stores. One system utilizes wire baskets stacked on a four-wheel dolly; the other utilizes cardboard boxes on pallets. The data-gathering stage is nearly complete and rough draft report should be initiated by June, 1975.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute

INVESTIGATOR: Goulston, CL

SPONSORING AGENCY: Department of Agriculture, 1104-15864-005

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Aug. 1974 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041735)

#### 22 099640

##### MAINTAINING AND IMPROVING QUALITY AND MARKET LIFE CALIFORNIA-ARIZONA CITRUS IN FOREIGN MARKETS

Determine the effects of transit temperatures and relative humidities, postharvest fungicidal treatments, and handling, packaging, palletizing and containerization on arrival condition and appearance, quality, and market life of California-Arizona citrus in foreign markets. Ship citrus fruit, or hold in simulated transit conditions, after treating with individual or combinations of fungicides. Determine fungicide concentrations necessary to control storage decays and fruit spoilage. Determine fungicide residues on or in fruit at time of treatment and upon arrival in Europe or Japan. Develop and improve analytical methods for fungicides now used or expected to be used, as needed. Compare palletized and hand stacked shipments in mechanical and iced rail cars and containers for fruit cool-down rates, uniformity of fruit temperature control, and fruit injury and carton deterioration due to cargo shifting during loading, unloading and in transit. Citrus fruit are not adequately cooled in mechanically refrigerated rail cars during warm weather. Cooperative arrangements were initiated with ARS, rail and citrus groups to modify the air distribution system of a rail car for test purposes. A reversed air flow system was developed by ARS for evaluation in this rail car application. A laboratory procedure was devised for the quantitative determination of benomyl, a fungicide used on citrus after harvest. The method is less accurate than existing methods but is faster, more convenient and useful when greater accuracy is not necessary.

##### REFERENCES:

Recommendations for Exporting Florida Lemons Hale, PW; Houck, LG; Risse, LA, Citrus and Vegetable Magazine, V37 N7, 4 pp, Mar. 1976

PERFORMING AGENCY: Agricultural Research Service, Market Quality Laboratory

INVESTIGATOR: Houck, LG Norman, SM

SPONSORING AGENCY: Department of Agriculture, 5210-15880-001

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Mar. 1974 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041023)

#### 22 099642

##### MARKETING MARGINS AND COST COMPONENTS IN THE OIL CROPS INDUSTRY

Determine price spreads and cost components in producing, transporting, storing, and manufacturing oil crops and major products; and relate changes in structure, technology, and practices to changes in prices, margins and costs. Determine farm-to-retail price spreads from secondary data and develop cost components from special studies and surveys, using economic-engineering data and budget analyses. Develop costs for producing, storing, transporting and manufacturing oil crops and major products with initial attention being given to costs of manufacturing margarine, cooking and salad oil, and crushing soybeans. Progress was made toward improved ability to respond effectively to requests for marketing margins and cost components information. Close working relationships were maintained with VPI on cooperative work relating to costs of crushing and manufacturing salad dressing and mayonnaise. A cost simulation model, developed at VPI is now operational for crushing soybeans, refining soybean oil, and manufacturing margarine, cooking oil, mayonnaise, and shortening. These models along with information now in the FEDS provide a basis for estimating costs from the production of soybeans through the processing sector. The overall system can also provide information and resource use including capital, labor, energy, etc. The system was used during the year to develop a staff report on energy uses in the crushing sector.

##### REFERENCES:

US Situation for Oil Crops-Soybeans, Cottonseed, Peanuts, Sunflower, Safflower and Other Oilseeds, Doty, Ho, Jr, Res to Meet U.S. & World Food Needs, ARPAC Conf, Vol 1, pp 150-173, July 1975

Decision Making in Oilseed Processing Doty, Ho, Jr, Oil Mill Gazetteer, pp 20-26, Aug. 1975

A Representative and Deterministic Cost Component Model of the U.S. Vegetable Oil Industry, Lamm, RM, Jr; Johnson, JM, VPI and State Univ in Coop with Econ Res Service, Bulletin 107, 93 pp, Dec. 1975

PERFORMING AGENCY: Economic Research Service

INVESTIGATOR: Doty, HO

SPONSORING AGENCY: Department of Agriculture, CE-07-062-11-00

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041588)

#### 22 099643

##### ORGANIZATION AND EFFICIENCY OF THE PRODUCTION AND MARKETING SECTOR FOR OIL CROPS

Develop a structural schematic for producing, storing, processing, and distributing products in the oil crops industry. Analyze the competitive position of the oil crops industry with competing commodities and with the same commodities from competing countries. Evaluate the impacts of changes in economic, technical, and regulatory factors on the organization and efficiency of the oil crops industry. Determine the present economic structure of the oil crops industry and quantify the product flow through the various marketing channels as background to the development of the oil crops research program. Evaluate marketing patterns, regional competition, stock management and storage and transportation problems. Develop a spatial-temporal model for soybeans to analyze the impacts on industry organization and efficiency of changes in supply, demand, cost and institutional factors. Research on world relationships in the oil crops complex continued with the preparation of a paper for the World Soybean Research Conference held at the University of Illinois. World historical data were collected and used to estimate intercorrelations among several fats and oils to estimate consumption functions for fats and oils in several countries. Staff papers were prepared which analyzed alternative peanut policy proposals related to changes in legislation and administrative provisions of current law. Progress was made on the compilation and analysis of survey data on the capacity of the fats and oils refining industry. A 100-percent enumeration of the refining industry was completed and the data analyzed to determine the total and regional capacity of the oil refining industry. This work resulted in the publication of a special article in the Fats and Oils Situation. Data tables on energy used by type of energy, by month, and by State for the 1974 soybean, peanut, and flaxseed crops were prepared.

##### REFERENCES:

Storage Utilization in a Deficit Region Boutwell, A; Kenyon, E, Southern Journal of Agricultural Economics, V5, N1, pp 233-237, July 1973

Grain Storage in the Deficit South Atlantic Region Kenyon, E; Boutwell, A, VPI and State University, Research Division, Bull N90, 69 pp, May 1974

Cost of Producing Soybeans in the US, 1974 Walter, AS, Economic Res



Service, FOS-281 pp 34-40, Feb. 1976

Costs of Production for Soybeans, Peanuts and Flaxseed for 1974, 75 and 76, Walter, AS; Garst, GD, Economic Res Service, Bulletin 106 pp 28-31, Apr. 1976

PERFORMING AGENCY: Economic Research Service

INVESTIGATOR: Boutwell, WA

SPONSORING AGENCY: Department of Agriculture, CE-07-064-11-00

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041590)

## 22 135001

### ALTERNATIVE SYSTEMS FOR TRANSPORTING AGRICULTURAL OUTPUTS TO MARKET AND INPUTS TO PRODUCTION AREAS

**OBJECTIVE:** Determine the optimal transportation systems and facilities for transporting grain and fertilizer to maximize producer income. **APPROACH:** Estimate demand for transportation; estimate costs of alternative modes and handling facilities; estimate optimal transportation modes, system and location and types of facilities. **PROGRESS REPORT:** Optimal solutions for the grain and fertilizer distribution and transportation systems for the entire state of Iowa have been obtained. These solutions have been used to compute benefit cost ratios for upgrading 71 branch rail lines in Iowa. An analysis of the impact of rail abandonment on communities and elevators, the optimal sizes of rail shipments of grain to export and the optimal locations of facilities to load the unit trains of grain has been made.

#### REFERENCES:

An Economics Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, National Technical Info Service; U.S. Department of Commerce, Mar. 1976, PB-251978/AS

The Economics of Upgrading 71 Branch Rail Lines in Iowa Baumel, CP, American Journal of Agricultural Economics, Volume 59, No. 1, Feb. 1977

Executive Summary-An Economic Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, Federal Railroad Administration; U.S. Dept of Transportation, Mar. 1976

Toward Optimizing the Rail Transportation and Distribution System, Baumel, CP, Proc Nat'l Symp on Transp for Agri & Rural America Nov 76

PERFORMING AGENCY: Iowa State University, Ames, Agricultural Experiment Station

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Iowa Cooperative State Research Service, 0065178 IOW02016

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0065178)

## 22 138363

### NEW AND IMPROVED SYSTEMS TO HANDLE PEANUTS AT COMMERCIAL STORAGES

Develop new or improved systems to handle peanuts as they are received, dried, stored, graded, shelled, bagged, and shipped. Presently used systems of handling peanuts will be evaluated for efficiency and cost. Where needed new or improved facility layouts, handling or flow processes, bagging and bulk handling, and sampling methods and equipment will be developed to reduce marketing cost and maintain quality as peanuts move through marketing channels. Peanuts packed in vacuum or vacuum with gas backflush environments showed no significant change in moisture content or grade after 12 months' storage at ambient temperature. Quality deterioration was more pronounced in the nitrogen atmosphere. All types of packaging materials used were effective barriers to contamination and insects. High vacuum sometimes caused pin hole punctures when packages handled roughly in shipping tests. Palletizing or using lower vacuum eliminated problem. Packaged seed peanuts showed no significant change in moisture, split kernel or bald kernel content through 6 months of storage. Germination dropped approximately 6% with controls averaging 2 points lower. No significant difference in germination when seed treated before storage. Packaging cost estimated at 1.75 cents/lb in 50-pound package.

#### REFERENCES:

Dimensional Changes in Peanut Pods, Kernels, and Hulls as Moisture is Removed During Curing, Slay, WO, J Amer Peanut Res and Educ Assoc., 1974

Damage to Peanuts from Free Fall Impact Slay, WO, J Amer Peanut Res and Educ Assoc., 1975

PERFORMING AGENCY: Agricultural Research Service, Department of Agriculture, 7704-15700-007

INVESTIGATOR: Slay, WO

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1974 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041935)

## 22 138368

### IMPROVED HANDLING AND DISTRIBUTION METHODS FOR DOMESTIC MARKETING OF FRUITS AND VEGETABLES

Find more efficient and effective ways of handling and distributing perishable products from Florida to domestic markets and determine their effects on market quality and consumer preferences. Test and evaluate improved handling methods under simulated and commercial environmental conditions. Develop and test methods for filling, handling, and transporting bulk pallet bins bagged or bulk citrus. Develop and test pallets and/or slipsheets for unitized handling of citrus peppers, and celery from production areas to retail warehouses. Explore possibilities for developing methods whereby railcars can be used more effectively in transporting citrus and winter vegetables from Florida production area. Initiate shipping test to assess the feasibility and comparatively evaluate handling poly bagged (5#, 8#) grapefruit in bulk bins boxes with conventional bagmaster boxes. A test shipment of two fiberboard bulk bins with bagged grapefruit was completed from Florida to New Jersey, and the two handling methods comparatively evaluated. This bin is a two-piece telescope design measuring 48 x 40 x 31 in. It will hold 200, 5-lb bags of grapefruit. This concept will permit filling the bin at a packinghouse and delivery to the merchandizing area of a supermarket, where the top portion is removed and the bagged fruit is exposed for consumers. The initial shipment was successful and future test shipments are planned.

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory, 7606-15840-004

INVESTIGATOR: Miller, WR Hatton, TT

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1975 COMPLETION DATE: Nov. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0042873)

## 22 138375

### IMPROVED PACKAGING, HANDLING, AND TRANSPORT OF WESTERN FRUITS AND VEGETABLES

Improve efficiency of packaging palletization, handling, and transport of western fruits and vegetables to reduce marketing costs and maintain product quality. New packages and methods of palletizing or unitizing these packages will be developed for efficient handling, transport, and marketing of fruits and vegetables. Research will determine package strength, will relate design and loading patterns to cooling rates and transit temperatures, and will correlate packaging, handling, and transport systems to maintenance of product quality. Research will include studies on new packaging and handling systems compatible with mechanical produce and with efficient use of transport vehicles. **PROGRESS REPORT:** Lettuce: A new carton with outside dimensions of 20-3/4 x 11-1/4 x 16 inches has been developed, which can be unitized on inexpensive slip sheets and mechanically loaded in rail cars and trucks. Stone Fruits: Fruit packed in a new foam tray usable in conjunction with metric-sized boxes sustained less damage in transit than fruit packed in currently used plastic trays and shipping containers. Lettuce: Transit temperature of lettuce packed in 500 lbs. bulk bins are satisfactory. Unitized loads of lettuce result in less product damage on arrival at market. Less labor and time is required to load and unload unitized lettuce compared to conventional hand methods.

#### REFERENCES:

Unitized Handling of Western Iceberg Lettuce Hinds, RH; Hinsch, RT, Intl Conf Handling Perishable Agr Commodities, Mich., Proceedings (27th) pp 130-33, 1975

A Mechanical Handling System for Lettuce--Can It be Done?, Hinsch, RT; Hinds, RH, Produce Marketing Assoc. Yearbook, 3 pp, 1975

Packing and Shipping Mechanically-Harvested Lettuce Hinsch, RT; Rij, RE, US Dept of Agriculture, Res Report 1049, 7 pp, 1976

Current Practices & Trends in Marketing Western Iceberg Lettuce in Relation to Other Produce, Rij, RE; Hinds, RH; Hinsch, RT; Harris, CM, US Dept of Agriculture, Res Report 1052, 9 pp, 1976

Temperature Requirements for Shipping California Green Peppers, Lipton, WJ, Produce Marketing Assoc. Yearbook, 3 pp, 1975

PERFORMING AGENCY: Agricultural Research Service, Department of Agriculture, 5202-15840-001

INVESTIGATOR: Hinsch, RT Rij, RE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1969 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0020846)

## 22 138378

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEMS

OBJECTIVES: Indicate ways to increase the economic efficiency of grain marketing, transporting and processing following dramatic changes since 1972 in marketing institutions, operational structure and policies related to industry. Evaluate the impact of alternative transportation rate structures on the organization of the grain industry. Examine alternative national grain inventory policies and their effects on market organization and performance. Based on results develop a set of recommendations for improving efficiency and/or reducing costs of inter-and intra-regional marketing of grain. APPROACH: Georgia will participate in the work of four objectives as outlined in the regional project statement. The work will include a survey of grain farms serving the Southern region to determine changes in marketing functions related to movement and storage of grain; the development of grain transfer costs for alternative modes of transportation; an analysis of grain inventory policies on storage and transportation needs; and recommendations from data obtained to guide grain firms on needed marketing facility investments under alternative situations. PROGRESS REPORT: Estimated costs of handling grain for various firm sizes in Georgia. Initial estimates of grain utilization by grain and class of livestock for several years in Georgia. Have begun revising an LP model of grain flows for the state of Georgia. This and related work has been done in cooperation with regional project SM-42. Presented seminar and several talks to civic groups on grain situation and foreign trade.

#### REFERENCES:

75 corn Crop Uncertain Bateman, WL, Farmers and Consumers Market Bulletin, Vol. 61 No. 4, Jan. 1975

PERFORMING AGENCY: Georgia Agricultural Experiment Station, Agricultural Economics Department, GEO01185

INVESTIGATOR: Anderson, RF Huang, CL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1974 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0065175)

## 22 138390

### IMPROVING RELATIVE HUMIDITY LEVELS AND CONTROL IN REEFER VAN TRAILERS AND CONTAINERS

The aim of the project is to determine prevalent relative humidity levels and control in conventional equipment; develop methods/systems to optimize the RH levels and control. The approach will be to: measure and record relative humidity levels in a statistically valid sample of reefer van cargo spaces, loaded and unloaded; evaluate data; define the prevalent functional level and control parameters; postulate the causes for deviation from the optimum levels; hypothesize the methods/systems required to optimize the levels and control; empirically test the hypothesis on prototype equipment; report the results and recommend methods/systems. An empty 35-foot van container was evaluated for air exchange. A known concentration of ethylene (C<sub>2</sub>H<sub>4</sub>) was used as an indicator. The van container had a track at the rear door so that a plastic curtain could be installed, thereby making the unit air-tight. Results with curtain in place and all 4 floor drains open showed 0.8 ppm C<sub>2</sub>H<sub>4</sub> air dilution after 1 hour. With floor drains open, and two 4-in. atmosphere vents open (1 front left and 1 on right rear side),

the air dilution was 2.2 ppm C<sub>2</sub>H<sub>4</sub>/hour. With vents and drain plugs open, plus an air-exchange system on the refrigeration system, the air dilution rate was 2.3 ppm C<sub>2</sub>H<sub>4</sub>/hour. The van container was loaded with 920 4/5-bushel export cartons packed with styrofoam balls, plus 2 diphenyl pads (top and bottom of each carton); cartons were stacked on slipsheets in a chimney stack, 9 per layer, 6 high plus 1 floating on each side. Results indicated that the styrofoam balls absorbed C<sub>2</sub>H<sub>4</sub>, and after 24 hours the styrofoam balls still retained a portion of C<sub>2</sub>H<sub>4</sub>. Preliminary observations indicated a 70% relative humidity level at 20.C.

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory, ARS 7606

INVESTIGATOR: Goddard, WF

SPONSORING AGENCY: Department of Agriculture, 7606-15840-002

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0042497), Smithsonian Science Information Exchange (GU 42497 1)

## 22 138400

### REDUCING PHYSICAL AND QUALITY LOSSES OF WHOLE SOYBEANS IN TRANSPORTATION AND HANDLING

The objective is to reduce physical and quality losses, handling and transportation costs for seed, food and processing grade soybeans shipped to domestic and world markets. The type, extent, and causes of physical losses and damage and quality deterioration in the whole beans in the various handling, processing, and transport modes will be identified by shipping and handling surveys and experiments. Alternative handling techniques and improvements in transport and handling equipment and transport and storage environments which may reduce such losses will be identified and developed. This will include single mode and multi-modal transport by truck, railroad, van containers, and barge-ship-barge shipments. These innovations will be evaluated in shipping and handling experiments to develop cost and performance data and appropriate recommendations for improving the handling and transport of the products.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing, Research Institute, ARS 1104

INVESTIGATOR: Nicholas, CJ Bailey, WA

SPONSORING AGENCY: Department of Agriculture, 1104-15881-004

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Apr. 1976 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0043052)

## 22 138481

### RAIL WHEAT TRANSPORT EFFICIENCY STUDY

To enhance and improve the physical efficiency of the marketing/transportation distribution system for grains in the hard winter wheat belt moving to domestic or export points, recognizing and utilizing the inherent advantages of rail transportation. Physical distribution study of alternative marketing/transportation systems.

PERFORMING AGENCY: Texas A&M University, Texas Transportation Institute

INVESTIGATOR: Richards, HA Tel (713) 845-3321

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Hardesty, F Tel (202) 426-9682 Boone, JW

Contract DOT-FR-65104

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$630,000

ACKNOWLEDGMENT: FRA, TRAIS

## 22 153666

### LASH AND OTHER INTERMODAL SERVICES IN THE PACIFIC NORTHWEST EXPORT DISTRIBUTION SYSTEM

Identify potential economies that could be obtained from movement of agricultural and forest products from the Pacific Northwest via the Columbia-Snake navigation system into overseas markets by recently innovated intermodal transportation systems such as LASH, standard intermodal containers, and ocean-going barges. Identify products that would lend themselves to movement from the Pacific Northwest into foreign markets via the above transportations system and determine least cost routes and modes of moving these products.

#### REFERENCES:

The Relationship Between International Trade and Transportation:

Theory and Developments, Jones, JR, Nat Symp on Transp for Agriculture and Rural Amer, Paper, Nov. 1976

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics, CSRS IDA

INVESTIGATOR: Jones, JR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, IDA00719

Contract 616-15-85

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070665)

## 22 153674

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage, and distribution system. Historical data on production and utilization of agricultural products and inputs will be projected to 1985 and 1990, as a means of developing spatial and temporal patterns of transportation. A time-staged transshipment model will be used to identify least cost organization of the agricultural industries and the effect of changes in transport requirements, as a basis for evaluating effects of alternative public and private decisions. Data on acreage, yield, and production of grain by county is being collected in preparation for projection to 1990 and 2000. Livestock classes are being defined and sources identified for similar projection. Data collection is being coordinated with project 05-348.

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, CSRS ILLU

INVESTIGATOR: Hill, LD Tel (217) 333-2455 Hoffman, L

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, ILLU-05-0344

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070435)

## 22 153703

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. Develop models, collect data and project spatial and temporal qualities of agricultural inputs and outputs to be transported. Develop models, collect data, and estimate optimal configuration of rural freight flows and number, size and location of processing and distribution facilities. Develop models, collect data and estimate impact of state and national transportation regulation on the rural transportation system. Initiated work to project the demand for agricultural transportation in Iowa to 1985 and 2000. Will project quantities of grain and fertilizer by counties. Inventoried state transportation regulations.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, CSRS IOW

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, IOWO2173

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070220)

## 22 153718

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990, estimate the optimal rural freight transportation, storage and distribution system, evaluate the economic effects of alternate railroad ownership and financial policies. Develop models for estimates of agricultural output and

input usage by state to 1985-1990. Collect historical data on agricultural production and input usage of commodities. Project spatial and temporal pattern of outputs and inputs to be transported. Develop or modify a time staged transshipment model of spatial and equilibrium using supply and demand estimates, shortage, processing and distribution costs and transportation costs and rates. Cost and rate data will be collected. Estimate the optimal configuration of rural model and intermodal freight flows. Measure social and economic costs and benefits of alternate rural transportation networks on rural communities. Inventory and describe existing ownership pattern. Estimate cost of governmental and private purchase and upgrading cost of rail lines. Use case studies to compare low volume rail line cost revenues, service, and operating characteristics under state ownership and operation alternatives. Evaluate the costs and benefits of ownership alternatives and abandonment of railroad lines. A research planning meeting was held in October to discuss jointly plans for developing an analytical model for regional analysis. Satisfactory progress was made in designating a macro model to be used for regional analysis and a micro model for use in analysis of specific problems. Plans for uniform collection of historical data on agricultural production and input usage in the region and procedures for estimating production and usage in 1985 and 1990 have been completed.

PERFORMING AGENCY: Kansas State University, Department of Agricultural Economics, CSRS KAN

INVESTIGATOR: Sorenson, LO

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, KAN00966

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070301)

## 22 156972

### POTENTIAL IMPACTS OF CONTAINERIZATION AND INTERMODAL MOVEMENTS OF AGRICULTURAL COMMODITIES AND PRODUCTS

This study will evaluate the potential for and assess the economic impact on shippers, carriers, and receivers resulting from increased use of containerization and intermodal movements of agricultural commodities and product inputs. APPROACH: This is a basic line study directed to one area of the abandonment question (i.e. alternatives for meeting increasing freight transportation needs of rural areas). The information developed in this effort will furnish guidelines to decision makers relating to available alternatives for moving inbound and outbound freight in rural areas confronted with rail abandonment. Primary emphasis of this study will be devoted to those rural communities currently receiving rail service on light density on branch lines in Texas and will focus on potential alternatives available to users in rural areas and the benefits and costs of implementing container and intermodal plans.

PERFORMING AGENCY: Texas A&M University, Agricultural Experiment Station, Tex-616-15-90

INVESTIGATOR: Lamkin, JT Owensby, RM

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

Contract 616-15-90

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070488)

## 22 157092

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

To estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative railroad ownership and financial policies. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. An extensive review will be made of new agricultural transportation techniques of operation, costs, rates, routes and policies from transportation firms and government agencies. Additional data will be obtained by interview of freight managers and policy decision makers. Specific field study will be completed on transportation problems in Wisconsin.

PERFORMING AGENCY: Wisconsin University, Madison, Department of Meat and Animal Science, CSRS WIS

INVESTIGATOR: Vilstrup, RH

SPONSORING AGENCY: Department of Agriculture, WIS02268

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071499)

## 22 179657

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM

Examine the interrelationships of geographic and seasonal pricing patterns and ascertain the effect of pricing patterns on structure. Seasonal and geographic price patterns will be analyzed to determine the factors causing changes in patterns over time. The current pricing patterns will be compared with programming results to determine those patterns consistent with least cost adjustments. Plans have been made to find reliable cost data, by area, for grain handling firms for use in linear programming models developed in SM-42. Survey of grain handling firms will be made in 1978 to obtain data on flows and structure for 1977. The questionnaire will have to be developed such that the data fit the needs of the linear programming models mentioned.

PERFORMING AGENCY: Tennessee University, Knoxville, Department of Agricultural Economics and Rural Sociology, TEN00486

INVESTIGATOR: Sappington, CB

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071728)

## 22 179658

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM

Indicate ways to increase economic efficiency of grain marketing, transporting, and processing following recent changes in marketing institutions, operational structures and policies. Evaluate impact of alternative transportation rate structures on the organization of the grain industry. Based on results of objectives A-D, develop set of recommendations improving grain marketing efficiency. A survey will be used to ascertain recent changes in marketing firms, functions and structure. Analytical models will be used to estimate the impact on marketing structure of selected changes in costs and national policies. Considerable emphasis will be placed on the effects of changes in transportation rates. From the results of the various analyses to be made, recommendations will be made to improve marketing efficiency.

PERFORMING AGENCY: Mississippi State University, Department of Agricultural Economics, MIS-4806

INVESTIGATOR: Phillips, TD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071805)

## 22 179659

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM

Indicate ways to increase economic efficiency in grain marketing. Evaluate impact of alternative transportation rates on grain industry. Examine interrelationships of geographic and seasonal pricing patterns and ascertain their effects on structure. Examine alternative national grain inventory policies and their effects on market organization and performance. Sample of grain firms in South will be surveyed by use of questionnaire to provide information on changes in and structure of the grain industry. Analysis of data will provide a measure of market performance. Grain transfer costs will be estimated from alternative transportation rate structures and based on

rates, optimal location for grain facilities will be determined. Representative seasonal and geographic grain prices will be obtained from secondary sources to determine price patterns. These will be compared with price patterns from earlier research. Programming will be used to study grain industry adjustments and price patterns to facilitate least cost adjustments. Alternative national grain inventory policies will be analyzed from standpoint of estimated potential impact on transportation needs, market organization, existing facilities, price stabilization and costs.

PERFORMING AGENCY: Auburn University, Agricultural Experiment Station, ALA00648

INVESTIGATOR: Stallings, JL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071807)

## 22 179660

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM

Indicate ways to increase the economic efficiency of grain marketing, transporting, and processing following dramatic changes since 1970 in marketing institutions, operational structure and policies related to industry and evaluate the impact of alternative transportation rate structures on the organization of the grain industry. A questionnaire will be developed for a survey of a sample of grain firms serving the southern region and other markets to determine changes in marketing firms and marketing functions and information on movement and storage of grain. These data will be analyzed to measure market performance. Grain transfer costs will be estimated by modes and changes in access to modes to ascertain optimal location and structure of facilities from alternative rate structures.

PERFORMING AGENCY: Kentucky University, Department of Agricultural Economics, KY00050

INVESTIGATOR: Shuffett, DM

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071952)

## 22 179661

### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM

Indicate ways to increase the economic efficiency of grain marketing, transporting and processing, following dramatic changes since 1972, in marketing institutions, operational structure and policies related to industry. Based on results of Objectives A, B, C, and D, develop a set of recommendations for improving efficiency and/or reducing costs of inter-and intra-regional marketing of grain. Program results will be used to estimate the impact on market structure of increasing costs, institutional barriers and national policies related to the grain industry. Empirical data from Objectives A through D will be used to develop guidelines firms can use in regard to operations in future facility investment for alternative market conditions and for considering national inventory policies. A survey of capacity and utilization of on-farm and commercial storage facilities has been completed. This will provide data on location and volume for use in drawing a representative sample for the up-coming intensive survey.

PERFORMING AGENCY: Arkansas University, Fayetteville, Department of Agricultural Economics and Rural Sociology, ARK00890

INVESTIGATOR: Morrison, WR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072047)

22 179662

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting, and processing following dramatic changes since 1972 in marketing institutions; evaluate the impact of alternative transportation rate structures on the organization of the grain industry; examine the interrelationships of geographic and seasonal pricing patterns and ascertain the effect of pricing patterns on structure. Examine alternative national grain inventory policies and their effects on market organization and performance; based on results of objectives A, B, C, & D, develop a set of recommendations for improving efficiency and/or reducing costs of inter and intra regional marketing of grain. Obtain data by questionnaire from a sample of grain firms in Ohio; compare and analyze data for changes since the base period 1971; gather and analyze data on inter regional transport costs; gather and analyze data on inter regional differences in grain prices; reserve policy will be examined from two points of view, and a price stabilization tool and as a world food reserve; optimizing models will be developed in conjunction with the SM-42 macro model; improve and further develop SM-42 macro model to assist in analysis of data from first four objectives; develop minimal cost industry solutions based on firm, transportation and storage analysis.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OH000596

INVESTIGATOR: Sharp, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072094)

22 179663

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting and processing following dramatic changes since 1972 in marketing institutions, operational structure and policies related to industry. Evaluate the impact of alternative transportation rate structures on the organization of the grain industry. Based on results develop a set of recommendations for improving efficiency and/or reducing costs of inter- and intra-regional marketing of grain. A survey of firms will be conducted to provide a description of the grain marketing industry in the mid-seventies and data for determining changes that have occurred in marketing firms, marketing functions and market structure. Transfer costs will be estimated for alternative transportation rate structures. This analysis will include intermodal rate comparisons such as relative rates between modes and changes in access to different modes of transport to ascertain the optimal location and structure of grain storage and processing facilities resulting from alternative rate structures. A quantitative model will be used to estimate the impact that changes in the transportation system will have on grain marketing. A set of recommendations will be developed for improved decisions relative to future facility investment under alternative market conditions and policies. Research planning and development of an activity timetable has been coordinated among the committee members. The basic linear programming model has received some additional attention. Data collection for projecting grain production for 1990 and 2000 has been started and is being coordinated with similar data needs for project 05-344.

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, ILLU-05-0348

INVESTIGATOR: Hill, LD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072621)

22 179668

**GRAIN PRODUCER'S MARKETING STRATEGIES FOR MEETING RAPIDLY CHANGING CONDITIONS IN SOUTH DAKOTA**

Analyze selected marketing conditions including "Basis" (cash-futures) relationships, changing markets, transportation and marketing costs for wheat, corn and soybeans at the country level in SD. Determine alternative grain marketing strategies for grain producers to meet rapidly changing marketing conditions and "Basis" trends as noted above. Prices (cash and futures) for wheat, corn and soybeans will be assembled and analyzed for changes since 1972 in the basis relationship in forward pricing of grains and in the storage hedge. The basis history for locations without rail transportation will be compared to those with rail service to determine any differences. The findings from Approaches 1 and 2 will be used to propose marketing strategies for producers of grain.

PERFORMING AGENCY: South Dakota State University, Department of Economics, SD00792

INVESTIGATOR: Sogn, AB

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073070)

22 179669

**ADEQUACY AND COST EFFECTIVENESS OF BULK COMMODITY TRANSPORTATION SYSTEMS**

Determine the adequacy of the transportation system for out-bound shipments of grains, soybeans and soybean products and for obtaining and distributing agricultural inputs such as fertilizer and fuel. Investigate potential shifts in marketing patterns or sources of production inputs due to changes in transportation costs, government regulations and transportation facilities, terminals and ports. Recommend appropriate policy and investment changes from the private and public sectors. Determine by county the quantities of bulk commodities to be transported in 1980 and 1985. Determine by commodity seasonal transportation and storage requirements. Determine existing on and off-farm storage capacity. Identify bottlenecks in the transportation system via a series of model solutions or simulations representing different levels of commodity movements and transportation capacity. Develop policy and investment recommendations. The first commodities to be considered will be corn, soybeans and soybean products. Wheat and other small grains, fertilizers and fuels will be considered subsequently. Key logistical factors will be investigated and assessed.

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-045

INVESTIGATOR: Dahl, RP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Oct. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0075095)

22 179670

**ECONOMIC FACTORS AFFECTING NORTHEAST MARKETS FOR LOCAL FRUITS AND VEGETABLES**

Determine the economic impact of changing energy utilization patterns on the Northeast fruit and vegetable industry. The distribution of Maine potatoes will be analyzed to quantify the effect of current and alternative marketing patterns on energy utilization. Initially the current product flow to various points in the Northeast will be determined. Also, a representative energy input per unit for highway and rail transport will be developed through a mathematical programming approach the cost of distribution--energy utilization tradeoff will be determined for alternative marketing patterns.

PERFORMING AGENCY: Maine University, Department of Agricultural and Resource Economics, ME08220

INVESTIGATOR: Kezis, AS

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074775)

#### 22 179674

##### GUIDELINES FOR RURAL AND COMMUNITY DEVELOPMENT IN ECONOMIC REGIONS OF MINNESOTA

Describe the interrelationships among the various sectors of the regional economics in western and southwestern Minnesota's agricultural economies. Develop an understanding of the changes that have taken place in these economies and predict the impact on the regions' incomes and employment of changes that may occur as a result of policy decisions on resource use. Input-output, linear programming and simulation models will be used to describe flows or transactions among sectors, multipliers coefficients and the systems. Both primary and secondary data sources will be used.

##### REFERENCES:

Grain Trucking in Minnesota--What it Costs in Region 6E Easter, KW; Nevins, RJ, Minnesota Agricultural Economics, No. 569 6 pp, July 1975  
Short Hauls Pay Best Returns to Truckers Transporting Grains Easter, KW; Nevins, RJ, Grain Age, Volume 16, No. 10 pp 8-11, Oct. 1975  
Bulk Commodity Transportation in the Upper Mississippi River Valley, Fruin, J; Young, W; Easter, KW; Jensen, H, Report to Corps of Engr 252 pp, 7507

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-084

INVESTIGATOR: Eastern, KW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0064438)

#### 22 179676

##### BIOLOGICAL AND ENVIRONMENTAL STORAGE AND TRANSPORTATION PARAMETERS THAT AFFECT GRAIN MARKETABILITY

Determine losses due to insect and microbial activity throughout the grain marketing system. Make economic analyses of physical losses, reduction in quality, and increased storage and transportation costs occurring in storage and transit as a result of identified biological activity. Reduce damage and contamination by these pests by developing control measures (chemical pesticides and generated low oxygen atmospheres). Estimate costs of control measures. Identify pest populations (insects and microbial) by monitoring commodities in transit from farm to export and by examining selected subplot samples of wheat and corn from export terminals. Characterize grain by density, composition, points of origin, and commodity grade factors. Relate these data to type of commodity, environmental factors before and during transit, prior invasion by fungi and insects, type of storage, transportation mode, and time periods in storage and transit. Develop chemical and inert atmosphere treatments for the disinfestation and storage maintenance of cereal grains in storage and transit. Determine effects of the treatment on quality factors and establish cost data. Studies to determine the extent of quality loss in wheat attributable to biological activity between origin and export destination were established. Two grain cooperatives, Far-Mar-Co, Inc. and Union Equity Coop. are providing storage facilities at the country elevator, inland terminal, and port terminal locations and cooperating in handling procedures to preserve identity of the grain lots under study. An interagency study was developed with the Federal Grain Inspection Service and the Agricultural Marketing Service to obtain information relative to insect and fungal populations and possible sources of infestation in wheat and corn exports. Pest populations in subplot samples obtained throughout the export system are being characterized by density, composition, port location, and date of shipment.

PERFORMING AGENCY: Agricultural Research Service, Grain Marketing Research Center, 3420-20620-006

INVESTIGATOR: Storey, CL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Nov. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043120)

#### 22 179677

##### INFORMATION FOR ORDERLY CHANGE IN THE FEED AND GRAIN INDUSTRY

Develop an efficient grain marketing structure for small area of Indiana that can be applied state wide. Evaluate effects of DOT railway abandonment on grain terminals location and elevator structure. Analyze information on number, size, and condition of grain and feed facilities. Develop criteria for efficient structure and flow pattern for industry. Evaluate number and location of subterminals by computer program. A research project was completed entitled, "An Evaluation of Subterminal Elevator Location in a Selected Indiana Region". The study focused on determining the number and location of subterminal elevators needed to efficiently market grain within a 16 county area of heavy grain production. With high export projections, nine subterminals were optimum. These facilities resulted in a savings to the area of over four million dollars in terms of decreased grain handling cost when compared to the cost of marketing the grain with no subterminals in operation. With low export assumptions, seven subterminals were optimum. If grain exports were to weaken, then careful evaluations of sites on the perimeter of the area should be considered before making the large investment needed for a subterminal elevator.

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND045040

INVESTIGATOR: Uhrig, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1969 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0032426)

#### 22 179680

##### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

PERFORMING AGENCY: Michigan State University, East Lansing, Transportation Economics Division, NEA-14-125-26-01-X

INVESTIGATOR: Schaffer, JD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043553)



22 179681

**APPRAISAL OF THE CAPABILITY OF THE TRANSPORTATION SYSTEM TO MEET NEEDS OF AGRICULTURE AND RURAL AREA**

Appraise the effectiveness of the rural transportation system to meet incurred demand for services and the capacity of the transportation system to economically move inputs under a policy of full production. Quantify effects of sharply increased exports on farm product storage and transportation facilities and identify long-run structural problems affecting the capability of the transportation system to serve rural areas. Utilize secondary data sources and interview local, state and Federal officials to obtain an assessment of the capability of the transportation system to meet agriculture's need. Models and other appropriate analytical tools are basic to making systematic appraisal of the data upon which to draw conclusions. Methods and data used in other parts of Economic Research Service to assess outlook and situation for frequent reporting were reviewed and adopted for applicability to agricultural transportation. Periodic reports on supply, demand and price situation for agricultural transportation were released during period covered. Simulation of the flow of grain into export through Gulf and West Coast ports showed adequate capacity for further increases in exports. Congestion and delays associated with large increments in assumed exports were eased by either operating more hours per day or by investment in new facilities. Truck and rail transportation costs for food were 12 percent higher in 1975 than in 1974, due mostly to higher rates for domestic movements. However, ocean freight rates for grains were substantially lower in 1975. These lower rates reflected the increased capacity of the world's merchant fleet and the recession. Governmental spending (1967 dollars) on rural road construction and maintenance decreased substantially over the period 1970 to 1975. Stable fuel tax rates, rapid escalation of construction costs, and early completion of rural portions of the Interstate Highway System was identified as factors contributing to the trends.

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- Marketing and Transportation Reinsel, EI, Economic Research Service Agr. Outl., AO-1 pp 12-13, July 1975  
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 Transportation Pollock, DD, Economic Research Service Agr. Outl., AO-5 pp 12-13, Nov. 1975

**PERFORMING AGENCY:** Department of Agriculture, Transportation Economics Division, NEA-14-126-11-00

**INVESTIGATOR:** Reinsel, EI

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** July 1974 **COMPLETION DATE:** July 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0041661)

22 179682

**TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS**

To inventory the capacity of plants transloading grain and dry bulk fertilizer and the rail and barge facilities serving them at deepwater ports on the Mississippi River, identify bottlenecks in this intermodal configuration and obtain data on investment costs for expansion of various components of these facilities, project the configuration of transportation and plants needed to handle the volume of grain and dry bulk fertilizer expected to move through this configuration by 1985 and added investments required for it. Data on current capacity and the cost of expanding its various components will be obtained from a survey of personnel of all grain elevators, fertilizers, and railroad companies operating at deepwater ports on the Mississippi River. Appropriate sampling of records and other procedures may be used in developing some of the details needed however. Working closely with Iowa State University in a concurrent study these data will be used to develop a time staged transshipment model to estimate optimal grain, fertilizer, and transportation facilities needed in deepwater ports on the Mississippi River to handle the business projected for 1985. A list of grain export facilities and of facilities for manufacturing and transferring fertilizer

material at deepwater ports on the Mississippi River has been compiled from preliminary contacts with some of them. A list of transportation companies serving these facilities is also being compiled. A file of literature on the subject has been assembled and reviewed. With this background, a checklist of survey data required for the study is being developed.

See also RRIS 22A 179683. 20A 179671.

**PERFORMING AGENCY:** Louisiana State University, Baton Rouge, Department of Agricultural Economics and Agribusiness, LAB01824

**INVESTIGATOR:** Traylor, HD

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Apr. 1976 **COMPLETION DATE:** Sept. 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0070539)

22 179683

**TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS**

Project quantities of grain and dry fertilizer to move through deepwater ports on the Mississippi River by 1980. Estimate structural adjustments needed in receiving, loadout and storage facilities to minimize cost of handling and transporting projected quantities at deepwater Mississippi Rivers ports. Estimate structural adjustments required in rail facilities at deepwater Mississippi River ports. Modify existing models, collect data and project 1980 quantities. Modify transshipment model and port simulation models, collect data and estimate required structural adjustments in grain and fertilizer facilities, and in railroad facilities at deepwater Mississippi River ports. 1. In process of developing model to estimate the quantity of grain and fertilizer moving through deepwater Mississippi River ports. 2. Collecting data on grain production, local livestock and grain processing capacity by crop reporting district in states which have shipped grains to deepwater Mississippi River ports.

See also RRIS 22A 179682. 20A 179671.

**PERFORMING AGENCY:** Iowa State University, Ames, Department of Economics, IOW02177

**INVESTIGATOR:** Baumel, CP

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Apr. 1976 **COMPLETION DATE:** Sept. 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0070487)

22 179684

**PLANNING RURAL TRANSPORTATION SYSTEMS**

Identify basic rural transportation market characteristics related to production and demand of transport services for the grain and soybean, fertilizer, feed and rural manufacturing and retail industries. Analyze sensitivity of grain, fertilizer and feed flows and shipper choice of mode, to transportation price adjustments in Oklahoma. Construct and demonstrate strategies by which individual, agricultural and rural manufacturing and retail users of rail services can adjust to local rail line abandonments or service discontinuances; and construct and demonstrate a procedure for evaluating public and private group investments in rural road and railroad branch line facilities, in an intermodal context, for application to small regions. Market characteristics are determined by surveys, econometric analysis and investment analysis. C-D. Individual firm and regional planning models will be approached with mathematical programming techniques. 1. The role of the new McClellan-Kerr Navigational System in the Transportation of wheat from Oklahoma and Kansas was assessed. 2. Long run adjustment alternatives for grain elevators losing rail service were evaluated. 3. A computer information and analysis system for railroads in Oklahoma is nearly complete. The system is capable of estimating required subsidies for continuation of abandoned lines and the benefits to communities of this type of subsidy program. The system will be put into use by the Oklahoma Department of Transportation in composing the Oklahoma State Rail Plan. 4. Further conceptual developments have been undertaken on the measurement of community effects of rail line abandonments. 5. Public service bulletins relating to transportation problems and policy have been distributed to the public.

**REFERENCES:**

The Influence of Water Transportation on Wheat Movements from Oklahoma and Kansas, Johnson, MA; Mennem, GM, Oklahoma Current Farm Economics, Volume 49 No. 1

The Railroad Revitalization and Regulatory Reform Act of 1976: Implications for Oklahoma, Johnson, MA; Mennem, GM, Oklahoma State University, Current Report No. 824

Barge Shipment of Wheat Through the Port of Catoosa Mennem, GM; Johnson, MA, Oklahoma State University, Current Report No. 427, May 1976

Sequential Line Approach to Evaluating Transportation Facility Adjustments, Johnson, MA, Southern Journal of Agricultural Economics, Volume 8 No. 1, July 1976

Railroad-Barge Competition in the Oklahoma-Kansas Wheat Transportation Market, Johnson, MA, Southern Journal of Agricultural Economics (Paper)

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01603

INVESTIGATOR: Johnson, MA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068185)

## 22 179686

### ALTERNATIVE RAIL RATES IN THE CORN SOYBEAN MARKETING SYSTEM

Evaluate alternative demand-sensitive rail rates on the corn, soybean marketing system. Compare impact of demand-sensitive rail rates with contract, annual volume and other types of rail rates on shippers, receivers and carriers. Collect data on monthly distribution of grain receipts, shipments, mode of transport, and destinations. Compare impact of alternative demand-sensitive rail rates with other types of rail rates on timing and mode of shipment, producer, and shipper income, and on carrier car requirements.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, IOW02226

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073201)

## 22 179690

### INCREASING EFFICIENCY IN THE GRAIN HANDLING, STORAGE AND TRANSPORTATION SYSTEM SERVING THE SOUTH PLAINS

Develop a detailed description of spatial and temporal grain flows and alternative mode freight rates. Determine least-cost grain distribution patterns and most efficient mode use for described grain flow. Estimate least-cost number, size and location of country elevators and feed mills to serve cattle feeding industry. Develop an interregional competition model of feed grain sector with emphasis on South Plains. Via personal interview and mail questionnaires of grain handlers, transportation companies and truck brokers existing grain flows and utilized mode freight rates estimated. These data entered into a spatial model to resolve least-cost distribution patterns and modes and then contrasted with actual distribution and utilized modes. Grain elevator, feed mill and transport cost functions and feed grain production data estimated and entered into model to optimize industry organization serving area cattle feeding industry. Spatial analysis of feed grain sector accomplished by estimation of regional demand and supply functions and transport costs which are data inputs for spatial equilibrium model. Because of no information on Texas' grain flows, a survey of Texas' grain handlers, cattle feedyards and feed manufacturers has been made. Texas Gulf ports are a major outlet for Texas' grain production. Approximately 73, 49 and 12 percent of Texas elevators' respective wheat, grain sorghum and corn shipments were to Texas Gulf ports. Texas cattle feedyards received 31 and 63 percent of elevators' respective grain sorghum and corn shipments. Nearly all feedgrain shipments to feedyards were via trucks. About two-thirds of the grain sorghum shipments to Texas Gulf

ports were via trucks, while three-fourths of the State's wheat shipments to Gulf ports were by rail. Eight percent of Texas elevators' wheat shipments were to out-of-state elevators. Texas flour mills received 3 percent of Texas elevators' wheat shipments, while out-of-state flour mills received less than 1 percent of the elevators' shipments. On a state-wide basis, grain elevators received 59, 12 and 29 percent of their respective wheat receipts from Texas producers, other Texas elevators and out-of-state sources. About 88, 10 and 2 percent of elevators' grain sorghum receipts originated from producers, other Texas elevators and out-of-state sources, respectively. Texas' cattle feedyards received 11, 82 and 7 percent of their grain sorghum from producers, Texas elevators and out-of-state sources, respectively.

#### REFERENCES:

Optimizing Subindustry Marketing Organizations: A Network Analysis Approach, Fuller, S; Randolph, P; Klingman, D, American Journal of Agricultural Economics, Volume 58 No. 3, Aug. 1976

A Cotton Ginning Problem Klingman, D; Randolph, P; Fuller, S, Operations Research, Volume 24 No. 4, July 1976

An Interzonal Trade Flow Model for the Texas Feed Grain Industry, Knudson, B, MS Thesis, Dec. 1976

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics

INVESTIGATOR: Fuller, SW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1975 COMPLETION DATE: Mar. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0067558)

## 22 179693

### ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export market techniques and strategies with respect to the logistics and costs of marketing and transportation. Evaluate alternative inventory and export policies with respect to price stability and producer and consumer utility. Grain movement information will be collected from the railroad companies and the Statistical Reporting Service, U.S.D.A. Also the transportation costs of shipping grain by rail and truck-barge will be estimated. With these basic data, existing transportation models will be developed to identify least cost routings for wheat and barley from various origins in Montana to port facilities on the West Coast. The specific procedures include using historical data to estimate and project demand and supply imbalances in world grain trade, calculating the variability in supply and demand and surplus and deficits under alternative assumptions of world production and consumption; and developing models that will show the affect of alternative inventory policies on the size and variability of world grain surplus or deficits.

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB0078

INVESTIGATOR: Cramer, GL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071923)

## 22 179694

### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS

To evaluate alternative export marketing techniques and strategies with respect to: their effects on the structure of the domestic grain marketing firms, domestic price levels and regional price relationships, price responsiveness and uncertainty, regional exports and domestic rail rate differentials, the logistics and costs of marketing and transportation, market share and market power in world grain trade and economic incentives to producing and marketing firms. To evaluate alternative inventory and export policies with respect to: Marketing efficiency, price stability, producer and consumer utility, their effect on private and state trading systems, servicing the export markets and the effects of export embargoes on prices and market share. Information theory, models of demands and prices of product characteristics, grain users' attitudes toward product characteristics and grain samples will be used to study grades. Private and public grain prices and utilization will be estimated from information provided by recent



studies on storage costs and demand characteristics. Econometric models of international production, consumption and trade will be constructed. Mathematical programming and queuing models will be used to study grain routing. A linear programming model that was previously developed and used for evaluation of rain grades was revised and improved. Construction of a model for forecasting U.S. grain production was initiated. Alternative methods of aggregating feed grain production were examined, i.e. weighting by feed values, weighting by relative prices and weighting by metric tons. All three methods of aggregation gave essentially the same absolute variation in production over the time period examined. In an effort to separate the affect of weather variability of yields from other factors, several alternative regression models are being developed for 1950 through 1975. The weather affect on yields is measured as a residual. In the case of corn, non-weather variables explain about 92 percent of the total variability in yields over the 15 year period.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics

INVESTIGATOR: Ladd, GW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071725)

## 22 179695

### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export marketing techniques and strategies with respect to: Economic incentives to producing and marketing firms. Domestic price levels for grain. Market share and market power in world grain trade. The logistics and costs of marketing and transportation. Price responsiveness and uncertainty. Compare grading procedures and other terms of contracts used in world trade. Identify the impact of the fair average quality method of grading on all sectors of delivered quality, value, and prices. Evaluate alternative marketing procedures such as identity preserved shipments, FOB, and CIF. Through interviews and secondary data, determine the volume being moved under these alternatives for major importing countries. Use existing spatial equilibrium and transportation models to identify lease cost routings for grain from origin to port.

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-072

INVESTIGATOR: Turner, MS

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071857)

## 22 179696

### ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export strategies with respect to: Structure of domestic grain marketing firms, domestic price levels and regional price arrangements, regional exports and rail rate differentials, logistics and costs of marketing, economic incentives to producing and marketing firms. Evaluate alternative inventory and export policies with respect to: Price stability, producer and consumer utility, prices and market share. Project demand and supply imbalance in world grain trade. Develop models to measure the effect of inventory and trade policies on variability of world and U.S. grain surplus or deficit, trade patterns, and economic incentives at the producer level. Use existing spatial equilibrium models to identify least cost routings from origin to port. Plans were developed to start work on the following as Ohio's contribution: (a) Listing of all grain exporting facilities at ports; (b) Listing of all unit train facilities in U.S. originating grain for export; (c) Listing of all barge loading facilities originating grain for export.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO000597

INVESTIGATOR: Sharp, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071808)

## 22 179697

### ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export marketing techniques and strategies with respect to: The logistics and costs of marketing and transportation; economic incentives to producing and marketing firms. Develop a model with which to analyze the effects of alternative marketing techniques of economic incentives and price level for grain at the producer level. Use existing spatial equilibrium and transportation models to identify least cost routings for grain from origin to port. Adapt mathematical programming models and queuing theory to reduce congestion and cost in rail yards serving grain ports.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01662

INVESTIGATOR: Oehrtman, RL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: 1970 START DATE: July 1977 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073046)

## 22 179698

### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING

Evaluate alternative export marketing techniques and strategies with respect to: Market share and market power in World grain trade; the logistics and costs of marketing and transportation. Evaluate private versus state trading systems for grain with respect to relative market power between countries with different systems. Develop cost data--Use spatial equilibrium and transportation models. Evaluate identity preserved shipments through interviews and secondary data. Describes the marketing decisions and strategies of different marketing agencies in countries having different systems of marketing. Data will be obtained through interviews with government and private agencies in several countries. Describe domestic and foreign policies directly affecting grain export, volumes and prices in major grain exporting and importing countries.

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics, IDA00725

INVESTIGATOR: Jones, JR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071187)

## 22 179699

### ECONOMIC EFFECTS ON AGRICULTURE OF THE NORTHEASTERN RAILROAD SYSTEM

Determine rail tariff rates and associated service charges levied on agricultural transportation activities in New England under plans to reorganize the Northeastern railroad system; determine financial stability and profitability of regional agri-business and farms under projected rail service cost functions; identify, describe, and quantify economic response and potential structural shifts within the agricultural industries of the region; simulate aggregate farm production levels resulting from projected changes in input prices. Synthesize rail service cost functions from reorganizational guidelines using cost budgeting techniques. Secondary data and sampling surveys will be used to identify production coefficients of farms. Linear programming techniques will simulate microeconomic response of agri-firms to adjustments in transportation costs. Aggregated response parameters will be used to identify structural and production shifts. Conducted through literature review concerning methodological and data requirements of research. Outlines for survey questionnaires were developed to compile data on the technical coefficients of agricultural production. A review and analysis of the tariff and pricing strategies of rail reorganization is underway. Historical rail tariff data and transportation pricing programs on the movement of agricultural commodities into New England has been compiled.

PERFORMING AGENCY: Connecticut University, Storrs, Department of  
Agricultural Economics and Rural Sociology, CONS00475

INVESTIGATOR: Seaver, SK

SPONSORING AGENCY: Department of Agriculture, Cooperative State Re-  
search Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr.  
1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-007664)

23 058757

## METHODOLOGY FOR THE DESIGN OF URBAN TRANSPORTATION INTERFACE FACILITIES

The purpose of this research is to: 1. develop a set of flexible criteria for the evaluation of alternative station designs, with emphasis on potential implementation constraints and operational efficiency, 2. develop a standard methodology for the design of the layout of urban transportation terminals, 3. apply the methodology developed to a real world situation as a test of the procedures developed, 4. disseminate this methodology to the transit user community for application. STATUS: During the first phase of the research, emphasis was placed on developing a general station design evaluation framework. Functional components of stations, including pedestrian movement facilities, line haul access areas, and communications facilities were identified. A set of generalized terminal evaluation criteria were adopted, and for each criterion, the viewpoint of the user, the special user, and the operator was examined. These criteria include: 1) Passenger Processing Performance; 2) Environmental Conditions; 3) Fiscal Considerations. The level of satisfaction of these criteria is evaluated through the use of an interest impact matrix. Both a cost-benefit (dollar) and subjective index are used in the ranking of design alternatives. A generalized framework for the use of the impact-interest assessment matrix has been advanced, several computer based planning and design methodologies were examined and included in the framework, and a user's guide has been completed. The methodology is now being tested in two types of applications: new transit station designs and renovation of existing transit facilities.

### REFERENCES:

Criteria for Evaluating Alternative Transit Station Design Hoel, LA; Demetsky, MJ; Virkler, MR, Feb. 1976  
Methodology for the Design of Urban Transportation Interface Facilities, Hoel, LA; Demetsky, MJ; Virkler, MR, Dec. 1976  
Design of Transportation Interface Facilities: A Procedural Guide, Demetsky, MJ; Hoel, LA; Virkler, MR, July 1977

PERFORMING AGENCY: Virginia University, Department of Civil Engineering  
INVESTIGATOR: Hoel, LA Demetsky, MJ  
SPONSORING AGENCY: Department of Transportation, Office of University Research  
RESPONSIBLE INDIVIDUAL: Paulhus, NG, Jr Tel 202-4264208

Contract DOT-OS-50233 (CS)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1975 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$126,000

ACKNOWLEDGMENT: TRAIS, OST

23 058815

## CONTINUED SUPPORT BY THE BART IMPACT ADVISORY COMMITTEE

The BART Impact Program review effort to be conducted by the Advisory Committee is an extension of the provision of advice and assistance to the Departments during the implementation phase of the program. The Committee shall review and provide consultation in all areas of the program to determine what impacts occur, which are attributable to BART, why they occur, and how this information may best be used by the Bay Area as well as by other metropolitan areas contemplating construction of a rapid transit system.

PERFORMING AGENCY: National Academy of Engineering  
SPONSORING AGENCY: Office of the Secretary of Transportation; Department of Housing and Urban Development  
RESPONSIBLE INDIVIDUAL: Dye, I

Contract DOT-OS-60092

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1973 TOTAL FUNDS: \$154,190

ACKNOWLEDGMENT: TRAIS

23 059246

## URBAN TRANSIT PLAN EVALUATION

The objective is to compile and condense the materials and results of the transportation planning process in a city pertinent to an UMTA review of transportation system implementation plans. Further, UMTA is interested in determining the response of communities to the Transportation Improvements Programs (TIP) guidelines.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company

SPONSORING AGENCY: Transportation Systems Center, R6708

RESPONSIBLE INDIVIDUAL: Rubin, D Tel (617) 494-2160

Contract TSC-1253

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$21,628

ACKNOWLEDGMENT: TRAIS (R6708)

23 059919

## STUDY OF LOGIT ANALYSIS OF RAPID TRANSIT ACCESS CHOICES

The project will provide an Analysis of Rapid Transit Access Choices by the undertaking of six tasks: 1) Choose Test Sites considering origin-destination data base, representation of rail and bus rapid transit; 2) organize and finalize a data base by processing files for study sites, 3) utilize the task 2 data base to aid in the derivation of disaggregate behavioral models of rapid transit access mode choice behavior; 4) analyze task 3 models as an attempt to explain variations in model parameters; 5) evaluate the application of the logit models in rapid transit modeling and planning by considering issues other than transferability; 6) document the study as a comprehensive analysis of the rapid transit access planning manual as originally planned.

PERFORMING AGENCY: Virginia University

INVESTIGATOR: Demetsky, MJ Korf, J

SPONSORING AGENCY: Urban Mass Transportation Administration, VA-11-0005

RESPONSIBLE INDIVIDUAL: Levinsohn, D Tel (202) 426-9271

Grant VA-11-0005

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$98,976

ACKNOWLEDGMENT: TRAIS (VA-11-0005)

23 099391

## IMPROVED PASSENGER SERVICE PROGRAM

Provide near and long-term technology to permit maximum effective use of the rail passenger systems. Provide technological data and advice to the Secretary of Transportation for use in his responsibility in connection with Amtrak. Provide support to Amtrak in developing new rail passenger equipment. Provide direct R&D support to Northeast Corridor Project. Formal coordination with Amtrak is being developed. Components on which R&D efforts are directed: Suspension support and guidance; signal, control and communications; braking/adhesion; energy management; propulsion; creature comforts; improved passenger train.

PERFORMING AGENCY: Federal Railroad Administration, Office of Passenger Systems Research and Development

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Mitchell, MB Tel 202-426-0966

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1966

ACKNOWLEDGMENT: FRA

23 136343

## TECHNOLOGY ASSESSMENT OF INTERCITY TRANSPORTATION SYSTEMS

The objectives of this RTOP are to enhance NASA's contribution to our nation's ability to provide adequately for its future transportation needs, including model systems and their energy requirements; and to determine the possible impacts on the timeframe and goals of aviation and air transportation R&T of the more promising future intercity transportation systems and corresponding urban structures. The approach will be based on extending the NASA/DOT joint agency Technology Assessment of Intercity Transportation Systems into Phase 2 activities. Phase 2 shall include the selection of initiation of follow-on studies of critical issues, constraints, barriers (identified in the Phase 1 technology assessment) which require further definition toward future objectives of the NASA aeronautics program. The follow-on activities emanating from Phase 1 which are of mutual interest to both NASA and DOT will be jointly funded by the two agencies, and those tasks of sole interest to each agency will be independently funded.

PERFORMING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA

INVESTIGATOR: Hornby, H

SPONSORING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA, 791-40 7670169

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975  
ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZH 40922 2)

**23 141169****RESEARCH INITIATION-CHOICE THEORY MODEL OF URBAN TRANSPORTATION SYSTEMS**

This research project will develop choice theory models of urban residential location decisions. These models will explicitly incorporate the simultaneity inherent in location, housing, automobile ownership and mode to work choices, and therefore reflect the most important impacts of alternative transportation engineering designs. Variables used in the models will include measures of the transportation level of service to work, neighborhood characteristics, housing attributes, auto ownership attributes, the accessibility of alternative locations to non-work opportunities, etc. Both the models will use the data from the 1968 Washington, D.C. home interview survey, supplemented with 1970 U.S. census data. Validation tests will be performed on the final models and the effect of a range of alternative transportation system designs will be evaluated.

**REFERENCES:**

Location, Housing, Auto Ownership and Mode to Work: A Joint Choice Model, Lerman, SR, Transportation Research Record, Trans Research Board, Transportation Res Rec 610, 1977

Neighborhood and Transportation Choice Lerman, SR, The Economics of Neighborhood, Segal & Berry (eds), 1978

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Civil Engineering

INVESTIGATOR: Lerman, SR

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG76-09431

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Mar. 1976 COMPLETION DATE: Aug. 1977 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 5765)

**23 156666****IMPROVEMENT OF NORTHEAST CORRIDOR RAIL PASSENGER SERVICE**

A continuing study of the state and federal roles in improving rail passenger service in the Northeast Corridor with particular emphasis upon the "Empire State Corridor" from New York City to Buffalo.

**REFERENCES:**

The Crisis in Rail Passenger Service in New York State: A Matter of Concern, New York State Senate Committee on Transportation, 1974  
Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1974

ACKNOWLEDGMENT: New York State Legislature

**23 156668****LIGHT RAIL TECHNOLOGY**

A study of the possible use of Light Rail in Nassau County: A Demonstration Project.

**REFERENCES:**

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977

ACKNOWLEDGMENT: New York State Legislature

**23 159652****NORTHEAST CORRIDOR TRANSPORTATION TWO YEAR REPORT**

Under Section 703(1)(E) of the Railroad Revitalization and Regulatory Reform Act in 1976 the following studies are required: (1) Financial and operating results of the intercity rail passenger service established under the Northeast Corridor Project; (2) Cost-Benefit analysis of improving various modes to meet future Northeast Corridor intercity passengers transportation needs; (3) Engineering, financial and market demand feasibility of establishing rail trip times of 2-1/2 hours between Washington and New York and 3 hours between New York and Boston.

PERFORMING AGENCY: Federal Railroad Administration

SPONSORING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

RESPONSIBLE INDIVIDUAL: Ditmeyer, SR

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: 1976 COMPLETION DATE: Feb. 1978

**23 164809****TRANSIT INFRASTRUCTURE PROJECT**

The objective of this project is to ensure that the most effective infrastructure can be produced for new transit facilities in Ontario. The infrastructure consists of the fixed facilities which support the vehicles, some of the more obvious elements being guideway structures, (at grade, elevated or underground) track, stations, and power distribution systems. The proposal is for a long-term general project, divided into 3 phases. Phase 1 consists of a state-of-the-art study and report, a report on relevant TDS experience, preparation of a design rationale, identification of R & D activities for Phase 2, along with continuing support for the LRT program. Phase 3 will be preparation of design manuals and codes. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can

INVESTIGATOR: Billing, JR Grouni, HN

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can, Transit Systems Research and Development

STATUS: Active NOTICE DATE: Mar. 1977 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

**23 170597****RAIL PASSENGER SERVICE AND MARKETING COMMUNICATION**

The general research objective is to provide the overall design for evaluating alternative methods for communicating the features of the VIA services to specific market segments. A sample of 400-600 interviews is contemplated. Existing knowledge from other transportation studies will be consolidated, and a preliminary model of the communications process will be formulated based on these findings and those from related studies. Interviews will be held with designated individuals such as CN managers, advertising agency personnel, and government officials. A principal objective of these interviews will be to define the rationale for past communications programs, and to explore the range of possible alternatives. The overall design of a set of market tests for the Kingston area will be specified. These will be suitable for measuring the promise of selected appeals to selected market segments, using selected communications media. This research is intended to facilitate VIA management's subsequent evaluation of alternative communications strategies for rail services, by providing the designs of alternative tests for the Kingston market. The implementation of one or more of the tests may be the topic of future research.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.43.77

INVESTIGATOR: Turner, RE Tel (613) 547-2735 Arnold, SJ

SPONSORING AGENCY: VIA Rail Canada Limited

RESPONSIBLE INDIVIDUAL: Campbell, G

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: May 1978 TOTAL FUNDS: \$34,125

ACKNOWLEDGMENT: CIGGT

23 170626

## **NORTHEAST CORRIDOR RAIL SERVICE IN NEW YORK STATE**

A continuing study of action needed to improve Northeast Corridor Rail Service in New York State, including improvements to the East River and other Tunnels, road bed improvements, and a possible link connecting Grand Central Station and Pennsylvania Station in New York City.

### **REFERENCES:**

1978 Winter Storm Operations of the Long Island Railroad 1978  
Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977

ACKNOWLEDGMENT: New York State Legislature

23 177531

## **INTEGRATED MULTI-MODAL TRANSPORTATION SYSTEM TECHNOLOGY**

The objectives are to enhance NASA's contribution in providing adequately for the nation's future transportation needs, including inter-modal systems and their energy and safety requirements; and to determine the possible effects on the time-frame and goals of aviation and air transportation R&T of promising future multi-modal transportation systems and corresponding urban structures. The approach will be based on innovative projections of possible future technologies, forecasts of multi-modal transportation system concepts, and estimates of social trends. Advanced air and ground transportation systems utilizing innovative multi-modal terminals will be designed conceptually with the consideration of community growth, economic patterns, environmental and social acceptance and political realities. These concepts will then be evaluated by more detailed engineering analysis and a fuller consideration of economics, and the advantages or disadvantages of the system.

PERFORMING AGENCY: National Aeronautics and Space Administration, Ames Research Center

INVESTIGATOR: Jones, JL

SPONSORING AGENCY: National Aeronautics and Space Administration, Ames Research Center

Contract 791-40-4

STATUS: Active NOTICE DATE: May 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZH 770173)

23 177691

## **PERSONAL TRANSPORTATION MODES--AN ASSESSMENT OF USE, CHOICE, AND FUTURE PREFERENCES**

The objectives of the study are to: (1) evaluate the present and expected future individual preferences towards the automobile and other modes of transportation, (2) identify the factors that influence choice as reflected by current ownership or alternatives to ownership, and (3) identify use patterns of the automobile and other modes of transportation. The results of this study will provide a better understanding of the factors that now influence public preferences for the automobile and alternative modes of transportation, and an assessment of how those factors might operate under future social and economic conditions. The results also will contribute to a comprehensive assessment of automobile transportation being carried out by the Office of Technology Assessment (OTA) of the U.S. Congress. The objective of the OTA program is to assess the social, environmental, and economic impacts of prospective changes in the characteristics and use of the automobile. The study will be national in scope and consist of six major tasks. The first two tasks concern choice and use characteristics of automobile and will be accomplished using existing data sources. The next two tasks address current preferences and future choices regarding the automobile and other modes under certain conditions and will involve survey research to acquire data representative of various groups of individuals in the nation. The fifth task will be an assessment of future use patterns, and the sixth will be a synthesis of future alternatives and will serve as the integrating activity for the entire study.

PERFORMING AGENCY: Cambridge Systematics Incorporated

INVESTIGATOR: Sherman, L

SPONSORING AGENCY: National Science Foundation, ERS77-06108

### **Grant**

STATUS: Active NOTICE DATE: May 1978 START DATE: June 1977 COMPLETION DATE: May 1978 TOTAL FUNDS: \$243,072

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CT 445)

24 059297

**ANALYSIS OF RAIL TRANSPORTATION**

Tasks include (1) analyze the effects of socio-economic forces on rail transportation; and (2) analyze the effects of Federal actions on rail transportation with respect to financial assistance, economic and labor regulation (excluding labor safety regulation) of rail and the competing modes of air, highway, pipeline and water transportation; and Federal tax policy.

PERFORMING AGENCY: Barber (Richard J) Associates, Incorporated  
SPONSORING AGENCY: Office of Policy, Plans and International Affairs  
RESPONSIBLE INDIVIDUAL: Murphy, TR Tel (202) 426-4303

Contract DOT-OS-60505 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: Jan. 1978 TOTAL FUNDS: \$59,750

ACKNOWLEDGMENT: TRAIS

24 148339

**MILWAUKEE PROJECT-LOCAL LEVEL LABOR-MANAGEMENT WORKSHOP**

To develop and promote more open and effective Labor- Management communications, primarily at the local level. Intensive professional discussions are held in relation to job accountabilities and responsibilities, factors of railroad productivity, and the future of the industry. Professionally conducted group interaction sessions will give the participants the human relations tools needed to actively pursue constructive Labor-Management relations in their respective territories.

PERFORMING AGENCY: Chicago, Milwaukee, St. Paul and Pacific Railroad  
INVESTIGATOR: Gardner, B  
SPONSORING AGENCY: Federal Railroad Administration, Office of Policy and Program Development  
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract DOT-FR-T5192

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$22,000

ACKNOWLEDGMENT: FRA

24 152647

**THE ASSESSMENT OF TECHNOLOGICAL CHANGE IN REGULATED INDUSTRIES**

The objective of this research project is to develop analytic methods for assessing the impact of regulation on technological change. The approach will be to estimate the impact of regulation on productivity through its impact on technological change by controlling for all major factors other than regulations that influence productivity. The research will compare the performance of selected U.S. and Canadian railroads to estimate the efficiency losses due to regulation in the U.S. The approach will be founded on the use of the Canadian railroads' record. By controlling for those factors other than regulation that affect productivity levels and rate of change, the differences in the Canadian and U.S. records can be attributed to differences in regulation. This research will employ several different methods for examining the impact of regulation on productivity in regulated industry. First, an index number approach will be used looking at aggregate time series data. Second, several econometric modeling techniques will be used, employing cross-section analysis of U.S. and Canadian railroads, time-series analysis of both nations' railroads and time series cross-section analysis to estimate the technological progress of the rail industry in the U.S. and in Canada.

PERFORMING AGENCY: Data Resources Incorporated  
INVESTIGATOR: Christensen, LR  
SPONSORING AGENCY: National Science Foundation, Division of Advanced Product Research and Technology, APR76-23556

STATUS: Active NOTICE DATE: Jan. 1977 START DATE: Sept. 1976 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$137,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1697)

24 156651

**DEVELOPMENT OF A FREIGHT ROUTE COMPETITIVE TO CONRAIL**

An investigation of the establishment of a private rail system that would be competitive with CONRAIL in the Northeast in general and New York State in particular. This is a continuing study involving the Delaware and

Hudson Railway.

## REFERENCES:

Challenge and Decision for New York State: The Northeast Rail Crisis, New York State Senate Committee on Transportation, Jan. 1974

Abandoned Railroad Rights-of-Way New York State Senate Committee on Transportation, Mar. 1976

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1974

ACKNOWLEDGMENT: New York State Legislature

24 157599

**POST-1990 PLANNING ISSUES FOR THE NORTHEAST CORRIDOR PROJECT**

To identify and prioritize planning issues which should be studied over the next four years to determine needs for future improvements to the Northeast Corridor Rail Passenger Service.

PERFORMING AGENCY: Transportation Research Board, Study Comm on Post-1990 Planning Issues for Northeast Corridor

INVESTIGATOR: Hoel, LA

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Ward, EJ Transportation Research Board Tel (202)389-6337

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: June 1977 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$50,000

24 159629

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 5. RAILROAD FREIGHT CAR DISTRIBUTION**

Evaluate the current effectiveness of railroad level car distribution systems. Investigate policies currently used by railroads in inventorying cars to surplus and deficit terminals. Develop an empty car supply forecasting procedure. Design, recommend, and test an improved railroad level car distribution system.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$265,000

ACKNOWLEDGMENT: AAR

24 159650

**AMERICAN RAILWAY SYSTEM STUDY**

Under Section 901 of the Railroad Revitalization and Regulatory Act of 1976 the following tasks are being performed: (1) An examination of the current status and condition of the railroad freight industry; (2) Assessment of the effects of alternative rail corporate structures on the rail system; (3) Cost benefit analysis of electrifying high-density rail lines and improving them for high-speed passenger and freight operations; (4) Identification of rail economics that could result from improving local and terminal operations.

PERFORMING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

INVESTIGATOR: Boone, JW Tel (202)426-9682

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Ditmeyer, SR Tel (202) 426-8254

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1978

ACKNOWLEDGMENT: FRA

24 170612

## **ANALYTICAL PROCEDURES FOR THE STUDY OF A MULTIMODAL TRANSPORTATION CORRIDOR FROM BRUNSWICK, GEORGIA TO KANSAS CITY, MISSOURI**

The research will formulate workable procedures for the analysis of transportation needs in a corridor from Brunswick, Ga. to Kansas City, Mo. defined as an area roughly 100 miles wide along the corridor. The project consists in several tasks as follows: identify legislative constraints on development, develop initial transportation guidelines, develop techniques for identifying economic development opportunities, develop measures for comparing alternatives mixes of transportation services, formulate analytical models, and develop a data library.

PERFORMING AGENCY: Georgia Institute of Technology, DOT-OS-60512  
INVESTIGATOR: Jones, PS Sharp, G  
SPONSORING AGENCY: Office of the Secretary of Transportation  
RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1976 COMPLETION DATE: Jan. 1979

ACKNOWLEDGMENT: OST

24 170627

## **VALUATION OF RAILROAD RIGHTS OF WAY**

The study involves valuation of railroad rights of way, specifically properties transferred to Conrail under the Regional Rail Reorganization Act of 1973. Results will be used to support the government's case in the special court which is hearing challenges brought by the trustees of Penn Central and other bankrupt railroads in the Northeast.

PERFORMING AGENCY: Beasley and Beasley, Incorporated  
SPONSORING AGENCY: United States Railway Association

STATUS: Active NOTICE DATE: Feb. 1978 TOTAL FUNDS: \$130,275

ACKNOWLEDGMENT: United States Railway Association

24 173170

## **RAILROAD MANPOWER ADJUSTMENT TO TECHNOLOGICAL CHANGE THROUGH COLLECTIVE BARGAINING**

A case study of two midwestern railroads will investigate the problems encountered by labor and management in resolving the impact of technological change on the structure of train and yard crews. Emphasis will be placed on a historical analysis of management and labor relations, especially during the 1960's when Government intervention was prevalent in labor disputes. The study should contribute insight to the evaluation of current collective bargaining practices in the industry and suggest probable future trends in railway industrial relations.

PERFORMING AGENCY: Cornell University, Graduate School  
INVESTIGATOR: McCabe, DM  
SPONSORING AGENCY: Department of Labor, 91-36-76-04

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GC 1739)

24 179528

## **ECONOMIC ANALYSIS PROGRAM**

This program is the ongoing effort of the Office of Rail Economics and Operations involving: (1) The competitive status of the rail industry; (2) Analysis of the regulatory environment of the rail industry; (3) Commodity service involving perishable goods, Iowa Rail Plan analysis, coal transit efficiency, and wheat gathering analysis; (4) Freight car management including computerized freight car scheduling and freight car utilization research; (5) Labor/management relations involving experiments with work rules agreements, worker training, strike impact analysis, economic analysis of rail labor factors, and improvement in employee communications; (6) Intermodal programs involving both research and demonstration activities; (7) Economic analysis involving statistics and forecasting.

PERFORMING AGENCY: Federal Railroad Administration  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Boone, JW Tel (202) 426-9682

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: FRA

24 179673

## **IMPACTS OF ALTERNATIVE POLICIES ON EFFICIENCIES OF TRANSPORTING AGRICULTURAL AND FOREST PRODUCTS**

Estimate characteristics of demand and supply for transportation of agricultural and forest products; evaluate transportation industry marketing efficiency performance under existing institutional policies; identify effects on efficiency of transportation industry of alternative institutional policies; identify policies improving efficiency of transportation for individual commodities, especially forest products. Develop supply and demand models incorporating quality of service characteristics and competitive market variables at both the aggregate and commodity market specific levels identifying elasticity and cross elasticities and test ability of alternative institutional policies to effect parameters of supply and demand; utilize data base on costs, revenues and demand to specify impacts of alternative policies; specify those commodities or markets whose characteristics of supply and demand for transportation are so specific that national policy alternatives do not yield efficiency increases with emphasis on forest products; evaluate alternative policies and make recommendations for local, state and national government levels.

PERFORMING AGENCY: Washington State University, Department of Agricultural Economics, WNP00379  
INVESTIGATOR: Casavant, KL  
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072790)

25 058753

**SCENARIOS FOR ALTERNATIVE ROLES OF THE FEDERAL GOVERNMENT IN TRANSPORTATION**

The research shall evaluate the economic effects of existing and prospective Federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. All modes of transportation shall be encompassed intermodal coordinative institutions, and Federal policies affecting domestic intercity transportation in all phases. Economic evaluation shall include the study of efficient resource allocation and distributional effects of alternative policies together with consideration of both partial and general equilibrium effects. The research shall be interdisciplinary in scope, drawing upon engineering, economic, statistics, law, and administration.

**REFERENCES:**

An Integrated Policy Model for the Surface Freight Transportation Industries, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Econometric Estimation of Cost Functions in the Transportation Industries, Spady, R; Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Information Needs and Performance Measures Center for Transportation Studies, MIT, deNeufville, R; King, C, Report 76-15, Sept. 1976

The Rationale & Scope of Federal Transportation Policy Friedlaender, AF; Simpson, RW; Frankel, EG; deNeufville; Sloss, Center for Transportation Studies, MIT, Report No. 77-4, Mar. 1977

Hedonic Costs and Economics of Scale in the Regulated Trucking Industry, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 77-5, Jan. 1977

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies

INVESTIGATOR: Friedlaender, AF

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

Contract OS-50239 (FFP)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1975 COMPLETION DATE: Oct. 1977 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: TRAIS

25 059207

**PROCEDURES FOR INSTITUTING SEPARATE ROUTES FOR DISTINCT RAIL SERVICE**

Determine the elements that constitute basic railroad transportation service, identify theoretical and specific terms of those services which should be included under the rubric of distinct services. This will require identification of the characteristics which make some services distinct and analysis of whether provision of those services results in incremental costs to the railroads. Formulate guidelines to be incorporated into the Commissions rules. Describe the regulatory and institutional barriers to initiation of such pricing procedures.

PERFORMING AGENCY: Gellman Research Associates, Incorporated

INVESTIGATOR:

SPONSORING AGENCY: Office of Policy, Plans and International Affairs

RESPONSIBLE INDIVIDUAL: Bohan, FJ Tel 202-4264860

Contract DOT-OS-606167 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Mar. 1976 TOTAL FUNDS: \$41,502

ACKNOWLEDGMENT: TRAIS

25 099365

**VALUE CAPTURE POLICY**

This research explores legal, financial and community design issues resulting from the introduction of mass transit station facilities in a community. Collectively termed "Value Captive", these efforts are becoming increasingly important in the evaluation of transit projects. First year efforts developed major concepts and defined and analyzed the critical issues in the 3 concern areas using Houston, Texas as an example city. Year two took Value Capture and applied it to proposed transit improvements in Los Angeles, Louisville, Kentucky and Chicago. Problems and opportunities for the application of Value Capture techniques by one or more types of public administrative agencies were identified. This included an examination and comparison of significant legal barriers, economic issues, investment opportunities, sources and restrictions on funds, and potential community impacts related to

hypothetical examples of transit stop related development. The research teams worked closely with the municipalities involved and the Urban Mass Transit Administration. STATUS: Results from the first year of research detailing the legal, financial and community implications of Value Capture have been published and widely distributed. Second year research has focused on three cities: Los Angeles, Louisville, and Chicago. In each case, prospects for applying Value Capture to proposed mass transit development have been thoroughly evaluated. It was found that there is significant potential for the beneficial application of Value Capture, although the most appropriate techniques for applying it are not the same in each city. In application situations in this work, potential fiscal returns were found to be widely varying depending upon the community under examination, Value Capture techniques used, and the legal basis for their application. In all, it may be summarized that Value Capture's potential success is closely related to the success of the mass transit system itself. Good transit planning will definitely support the success of Value Capture but not insure it.

**REFERENCES:**

Value Capture Policy. 4 Vols. Introduction, Legal Element Financial Element, and Community Enhancement, DOT Publication, DOT-TST-75-85, Nov. 1974

Value Capture and Joint Development Applications Dec. 1975

How to Make Mass Transit Pay its own Fare Design and Environment Magazine, Apr. 1975

Value Capture Policy Planning Mag, Am Soc of Planning Officials, Apr. 1976

Joint Land Use and Transportation Development-Application of the Value Capture Concept, Transportation Research Board, NAS, Jan. 1975

Planning, Financing and Implementing JOint Development A National Transit Symposium, Miami, FLA., Jan. 1975

PERFORMING AGENCY: Rice University, School of Architecture

INVESTIGATOR: Sharpe, CP

SPONSORING AGENCY: Office of the Secretary of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, B

Contract DOT-OS-40007

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Dec. 1976 TOTAL FUNDS: \$175,000

ACKNOWLEDGMENT: DOT

25 128851

**TEXAS RAIL SYSTEM EVALUATION**

The major purpose of this study is to evaluate the Rail System Serving Texas and identify the operating and institutional constraints under which it functions. The study will evaluate the railroads serving Texas and recommend policies and actions which are necessary for the continued financial validity of these private carriers. In addition, the study will investigate the feasibility of increasing rail passenger service within Texas. Primary areas of investigation include transportation user's perception of rail service in Texas, Financial status of carriers in Texas, economic regulation review, rail system descriptions, rail labor, rail safety, grade crossings, state-local taxation of rail properties, energy pollution characteristics review.

**REFERENCES:**

History of Rail Passenger Service in Texas 1820-1970 Christiansen, DL  
The Technology of Rail Passenger Service Stout, RB; Christiansen, DL  
Amtrak: Its Texas Operations Christiansen, DL; Grady, DS  
An Evaluation of Intercity Travel in Major Texan Corridors Christiansen, DL; Stout, RB

Financial Overview of Railroad Companies Operating in Texas Owensby, RM

Railroad Employment Analysis Collins, PB

A Survey of Transportation User's Attitudes and Perceptions of Rail Service in Texas, Brusse, D; Lamkin, JT

Railroads and the Texas Freight Market Sammon, JP

Railroad Property Acquisition, Use, Taxation and Abandonment Buffington, JL

Economic Regulation of Railroads Stout, RB

Opportunities For Increased Rail Tonnage Lamkin, JT

The Impact of Rate Reducing Service Factors on Rail Tonnage, Lamkin, JT

Rail Abandonment in Texas: Its Status and Direction Lamkin, JT

Pollution and Energy Consumption of Railroad Transportation Buffington, JL

Socioeconomic Characteristics and Forecast Affecting The Demand for Railroad Transportation, Buffington, JL

Railroad Safety Collins, PB; Rogers, WC



The Work Rule Problem Collins, PB  
The Texas Rail System: An Operating and Facility Description Sammon, JP

An Evaluation of The Need for Intercity Rail Passenger Service in Texas, Christiansen, DL; Stout, RB; Grady, DS  
Considerations Influencing the Feasibility of Commuter Rail Service, Christiansen, DL; Grady, DS

PERFORMING AGENCY: Texas A&M University, Texas Transportation Institute

INVESTIGATOR: Richards, HA Tel (713) 845-3321 Sammon, JP

SPONSORING AGENCY: Texas State Government

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: Texas Transportation Institute

25 128852

## PRODUCTIVITY IN TRANSPORTATION AND PIECEMEAL DEREGULATION OF THE INDUSTRY

The position taken in this proposal is that technological and other changes have significantly altered the competitive situation in transportation. These changes raise the possibility of increasing productivity in transportation by returning to market forces at least partial responsibility for determining prices and outputs. Our specific area of interest is the exempt agricultural commodities. The research will provide useful results on the effects of extending these regulatory exemptions to railroads, including effects on energy consumption, car utilization, and other aspects of productivity. The research will examine the implications of deregulation on the future functioning of railroad rate bureaus and investigate the effects of user charges and subsidies on intermodal competition. A major benefit of the research will be a usable methodology for examining partial deregulation questions. The methodology will consist of a quantitative model of intermodal freight competition and a "users manual". The users' manual will consist of a series of model applications, representing the range of alternative regulatory instruments from direct regulation to subsidies and taxes. We will also publish the methodology and the results as articles in both professional and trade journals. Testimony will be presented to the appropriate committees of Congress.

PERFORMING AGENCY: Northwestern University, Evanston, Transportation Center, Leverone Hall

INVESTIGATOR: Moses, LN

SPONSORING AGENCY: National Science Foundation, Division of Advanced Product Research and Technology

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: 1975 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$110,000

ACKNOWLEDGMENT: Northwestern University, Evanston, Smithsonian Science Information Exchange (GSQ 1407)

25 129738

## URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES-TRANSPORTATION NEEDS ANALYSIS AND INFORMATION PACKAGE DEVELOPMENT

Based on previous needs assessment work the Consortium will conduct an analysis of the transportation-related needs, attempting to determine those for which technological solutions have been developed and need only to be applied, and those for which research is necessary. Project specifications and technical information packages will then be assembled, based on these analyses. Manuals on bus priority systems and transportation for the handicapped and elderly are being developed. Needs data are also being revised and updated.

### REFERENCES:

- Asphalt Improvements Oct. 1976
- Institutional Framework for Integrated Transportation Planning, Oct. 1976
- Integration of Paratransit with Conventional Transit Services, Oct. 1976
- New Standard Bus Equipment Oct. 1976
- Traffic Signalization Systems Oct. 1976
- Transit Systems Productivity Mar. 1977
- Transportation for Elderly and Handicapped Persons Oct. 1978
- Transportation Planning and Impact Forecasting Tools Oct. 1976

PERFORMING AGENCY: Public Technology, Incorporated

INVESTIGATOR: Burke, AC Tel (202)452-7789

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation; Federal Highway Administration; Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Linhares, AB Tel 202-426-4208

Contract DOT-OS-60076

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Jan. 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$735,000

ACKNOWLEDGMENT: DOT

25 136065

## TECHNIQUES FOR EVALUATING OPTIONS IN STATEWIDE TRANSPORTATION PLANNING/PROGRAMMING

The objective was to provide transportation planning methodologies that would be policy sensitive, allowing the testing and evaluating of options in a fashion that would produce timely results for decision-making. The research was focused on reasonable cost, sketch-planning type techniques having an application to issues of statewide transportation planning as part of the programming process. Phase I of the study identified and classified major transportation issues, data and methodologies. Phase II included the development of the procedural manuals for application of techniques and the testing of techniques in states in the approved study design.

Phase II Agency Report Publication, Pending.

### REFERENCES:

NCHRP Report 179--Evaluating Options in Statewide Transp Planning/-Progr-Issues, Tech, & Their Relationship-Phase I

PERFORMING AGENCY: Voorhees (Alan M) and Associates, Incorporated; System Design Concepts, Incorporated

INVESTIGATOR: Bellomo, SJ Tel (703) 893-4310 Stowers, JR Tel (202) 393-5911

SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Spicher, RE Tel (202) 389-6741

NCHRP 8-18

STATUS: Completed NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 COMPLETION DATE: May 1978 TOTAL FUNDS: \$300,393

ACKNOWLEDGMENT: Voorhees (Alan M) and Associates, Incorporated, National Cooperative Highway Research Program

25 144359

## THE IMPACT OF REGULATION UPON TECHNICAL CHANGE IN THE RAILROAD INDUSTRY

By examining the profitability of specific investments and innovations in Canada and the United States, the proposed research analyzes the role of the following factors upon technical change and innovation in the railroad industry: regulation, market structure, union work rules, competition, and the dispersion of economic activity. By choosing innovations in which all but one (or possibly two) of these factors are the same, and comparing the cost and demand structures associated with these innovations, it should be possible to isolate the impact of each of these factors upon technical change in the railroad industry. Innovations and investments that appear to meet these criteria include containerization, unit train, automatic coupling and braking systems, railroad operating and car management systems, centralized traffic control, automated hump yards, and investment in equipment and roadbed.

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies, 84329

INVESTIGATOR: Friedlaender, AF Tel (617) 253-3456

SPONSORING AGENCY: National Science Foundation, Office of Research & Development Assessment, Room P705, PRA76-17394

7617394-PRA

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$164,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 351)

25 153574

## TRANSPORTATION SYSTEMS IN COLORADO: NEEDS ASSESSMENT AND ANALYSIS FOR COMPREHENSIVE STATE TRANSPORT

To describe the components of the existing transportation sector in Colorado in a systematic framework. Identify goals for Colorado's transportation system and develop measures of performance on which to estimate the

achievement of such goals. Identify areas of discrepancy between the existing system and the goals for the system. Develop a set of recommended actions to achieve congruence between the state goals and the transportation system.

PERFORMING AGENCY: Colorado State University, Fort Collins, Department of Economics, CSRS COL

INVESTIGATOR: Blood, D Wagner, W

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, COLO0189

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: July 1976 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070684)

## 25 156620

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION, STORAGE AND DISTRIBUTION SYSTEMS

This project will evaluate the economic effects of alternative federal, state and local government policies on shippers, carriers, receivers, and rural communities. The study will: develop an inventory of existing regulation in participating states and at the national level; Measure commodity flows into and out of case study areas in terms of commodity, origin, destination, mode, type of carriers, (regulated, exempt, and private) backhaul, service variables such as timeliness, reliability and damage incidence will be measured. Cost coefficients will be obtained and adapted to model carrier firms operating under simulated regulated and unregulated conditions as determined from survey findings. Comparison of costs and services under regulated vs. unregulated conditions will provide the basis for evaluating the merits of alternative regulatory policies. A model will be constructed which will describe rural transportation systems as they presently exist and as they would exist under alternative state and federal regulatory frameworks. The likely performance of the transportation systems will be estimated as a function of the inter-and intra-modal competitive environment. Work during the first two months of this projects' existence consisted entirely of planning the theoretical framework and empirical approach for the research. Literature review has been completed and alternative methodological approaches have been weighed and evaluated.

#### REFERENCES:

Impact of Motor Carrier Deregulation on Agriculture, Rural Shippers and Receivers, Felton, JR; Anderson, DG, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-15 30 pp, 1976

The Inherent Structure, Behavior and Performance of Motor Freight Industry, Felton, JR, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-7 18 pp, 1976

Economics of Scale in Highway Freight Transport: A Review of the Studies, Felton, JR, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-8 21 pp

State Economic Regulation of Motor Carriage: Research Procedures on the Law and Its Interpretation, Hutsell, RC, Jr, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-12 9 pp, 1976

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, CSRS NEB

SPONSORING AGENCY: Department of Agriculture, NEB-10-071

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070254)

## 25 156676

### RAIL BRANCH LINE SUBSIDIES AND REHABILITATION

A study of the need for rehabilitation of rail branch lines and methods of subsidizing service on lines operating in the red.

#### REFERENCES:

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (578)472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518)472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1973

ACKNOWLEDGMENT: New York State Legislature

## 25 156707

### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

The project will evaluate the economic effects of alternative federal, state, and local government policies on carriers, shippers, receivers, and rural communities. An inventory of existing transportation regulatory and policies will be developed. Commodity flows into and out of the state will be summarized from secondary sources. Data on origin, destination, mode, back haul, seasonality and rates will be based on surveys in case study areas. The relationship between service and the competitive structure of the transportation industry will be estimated through a survey of shippers and receivers. Service variables such as timeliness, reliability, and damage incidence will be measured. The likely performance of transportation systems will be estimated as a function of inter-and intra-modal competitive environment. A survey intended for country elevators has been prepared. It is designed to collect responses which can be used to test hypotheses regarding the quality of services provided by transportation firms, primarily railroads. The hypotheses center on the relative importance of various service variables to shippers and the extent that service varies by company, competition, and classification of the railroad bed (main or branch line).

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, CSRS ND

INVESTIGATOR: Cobia, DW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, ND01360

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070865)

## 25 157601

### DEVELOPMENT OF A POLICY SENSITIVE MODEL FOR FORECASTING FREIGHT DEMAND

To investigate and evaluate the application of disaggregate freight demand models in examining transportation policy alternatives. Using a mathematical model previously specified at Massachusetts Institute of Technology to investigate the adequacy of existing freight shipment data as the basis for model calibration. To calibrate and test such a model on alternative Federal intercity freight policy alternatives and the effects on modal shares, revenues, level of service and other factors.

#### REFERENCES:

Phase I Report. Development of a Policy Sensitive Model for Forecasting Freight Demand, Roberts, P; Terziev, M, July 1977

PERFORMING AGENCY: Massachusetts Institute of Technology, DOT-OS-70006

INVESTIGATOR: Roberts, PO Tel (617)253-1000

SPONSORING AGENCY: Department of Transportation, Office of Intermodal Studies

RESPONSIBLE INDIVIDUAL: Swerdloff, CN Office of the Secretary of Transportation Tel (202)426-4163

Contract DOT-OS-70006

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977 COMPLETION DATE: May 1979 TOTAL FUNDS: \$290,000

ACKNOWLEDGMENT: OST

## 25 160045

### FEDERAL POLICY IMPLICATIONS (FPI) PROJECT

The purpose of the Federal Policy Implications (FPI) Project is to respond to the interests of the Federal Government by bringing together the BART Impact Program (BIP) impact findings and their supporting data. BIP is a five-year study of the impacts of the BART system on travel conditions, economic activity, land use, public policies, and other aspects of life in the San Francisco Bay Area.

PERFORMING AGENCY: Voorhees (Alan M) and Associates, Incorporated

SPONSORING AGENCY: Office of Policy, Plans and International Affairs

RESPONSIBLE INDIVIDUAL: Grainger, GR Tel (202) 426-4168

Contract DOT-OS-70034 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1977 TOTAL FUNDS: \$78,650

ACKNOWLEDGMENT: TRAIS

25 160468

## **PUBLIC POLICY PROJECT OF THE BART IMPACT PROGRAM**

Direct measures of public policy formulation and implementation in the local governmental process permit an understanding of the significance of BART's impact, and are the basis for study of the contributing behavioral responses within the community and the governmental sectors. The project's concern with perception and response to these changes and the broad implications for local policymaking addresses the crucial issue of how the lives of people are affected by those identified BART impacts.

PERFORMING AGENCY: Metropolitan Transportation Commission

SPONSORING AGENCY: Office of the Secretary of Transportation

Contract DOT-OS-30176/208 (CC)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: May 1978 TOTAL FUNDS: \$115,000

ACKNOWLEDGMENT: TRAIS

25 179347

## **CONTINUATION OF MARYLAND'S OVERALL STATEWIDE ECONOMIC DEVELOPMENT PLANNING PROCESS**

The grant represents a continuation of ARC support for an economic development process in the Maryland Department of Economic and Community Development since 1973 when ARC provided assistance to create an economic development planning staff. The process has evolved into one which: (1) identifies and selects specific projects for study, evaluation, and recommendation, (2) provides economic development planning assistance to counties and multi-county districts, (3) participates in multi-state economic development regional organizations, (4) participates in State inter-governmental programs of economic development significance, and (5) provides analytical support to the Maryland Department of Economic and Community Development's other divisions and the Office of the Secretary. SCOPE OF WORK: Work during the nine-month continuation period will focus mainly on specific projects of interest to the Tri-County area of western Maryland. 1. Tourism Development. This work will assist the Tri-County Council of Western Maryland prepare a regional action plan for the development of specific tourism projects, and assess the potential for a conference-recreation complex in western Maryland. Specifically, activities will include: a. An inventory of facilities and potential recreational projects; b. Liaison and participation with the TCCWM's Regional Tourism Committee and staff; c. Selection of projects based on priorities and their economic impact. 2. Rail Utilization. This work will build on the analyses of rail line utilization, operations, and service gaps that were developed under the current grant. Specifically, activities will include: a. The development of strategies to enhance the economic viability of rail lines serving western Maryland and to close gaps between present and potential volume. b. The development of a monitoring system to study the progress or deterioration of marginally profitable rail lines. c. The development of alternatives for abandoned rail rights-of-way. 3. Coal Industry. The revitalization of the coal industry will have an impact on western Maryland.

PERFORMING AGENCY: State Department of Economics and Development

SPONSORING AGENCY: Appalachian Regional Commission, MD-5101-77-C1-302-05

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$28,500

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 3)

25 179675

## **AN ASSESSMENT OF THE ECONOMIC IMPACT OF USER CHARGES FOR INLAND WATERWAY TRANSPORTATION**

Evaluate the impact of alternative user charges for inland waterways upon shipping costs and consumer prices. Evaluate administration costs and revenue potential of alternative user charges. Develop information on inland waterway cost-sharing. Develop an economic model of interregional competition which emphasizes the role of transportation costs. By changing freight rates, their impacts on transportation mode, shipping patterns, and prices will be identified.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, Department of Agricultural Economics, VA-0375868-1

INVESTIGATOR: Shabman, L

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041974)

26 058329

**RAILROAD RESEARCH INFORMATION SERVICE (RRIS)**

Aquisition, selection, storage, retrieval and dissemination of research information that is generated by and/or that is useful to administrators, researchers, and other specialists in the railroad and related fields of transportation research. To provide a central point for industry, academia, government and others to disseminate technical information to the interested railroad related community-at-large or research results as well as on-going research efforts in the interest of obtaining technology utilization in an efficient manner. To provide a service to the research community in maintaining a current awareness of technological and economic research findings and developments.

PERFORMING AGENCY: Transportation Research Board

INVESTIGATOR: Houser, FN Tel 202-389-6611

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Ahmed, N Tel 202-4260955

Contract DOT-FR-74193 (CC)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$525,000

ACKNOWLEDGMENT: FRA

26 099429

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT, PHASE 4-LITERATURE REVIEW**

Background experience and literature in the various technical areas of interest under the Project are continually under review. A reference library has been established and maintained under this Phase.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: AAR

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This index serves not only as the reference for the publications and the corporate affiliations of authors of documents appearing in this *Bulletin* but also as the source for addresses of organizations that do not appear on page v. In general, if no address is listed after the name of an organization, the entry involves an author affiliation rather than a publication. Consequently, there are multiple listings for

many organizations, and all the document numbers should be checked. Some organizations have more than one office, and again there will be more than one listing of document numbers of possible interest. Each summary of ongoing research is indicated not only by the *A* in the document number but also by the use of italics for the entire number.

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