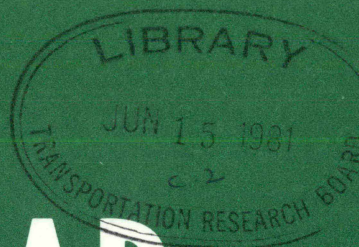


**RRIS**



# **RAILROAD RESEARCH BULLETIN**



**Spring 1981  
Volume 8 Number 1**

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August 1980 and January 1981

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

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Railroad Research Information Service  
Transportation Research Board**



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**Office Address**

2100 Pennsylvania Avenue, N.W., Washington, DC

**Telephone**

202-389-6611

**Telex**

710-822-9589

**Mail Address**

Transportation Research Board  
National Academy of Sciences  
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## Foreword

This *Bulletin*, containing 1159 abstracts of journal articles, research reports, computer programs, and magnetic tape data sets and 403 summaries of ongoing research activities, covers material accessioned by the Railroad Research Information Service between August 1980 and January 1981.

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.

### USING THE RAILROAD RESEARCH BULLETIN

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

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.

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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.

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An availability statement is included with each abstract. Because a large number of documents are available from a few major sources, space and printing costs have been reduced by abbreviating these and not indicating an address in the abstract. The standard abbreviations used by RRIS for availability statements are shown below, along with the complete name and address of each organization. In all other cases the organization from which a document may be ordered and its complete address are given in the availability

statement. 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 about the document desired. When ordering from National Technical Information Service, be sure to give the NTIS accession number as well as title and other information. A loan and photocopy service for many of the articles and papers cited is operated by two major transportation libraries, as explained on page vi.

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| <p><b>AAR</b><br/>Association of American Railroads<br/>1920 L Street, N.W.<br/>Washington, DC 20036</p> <p><b>AAR</b><br/>For technical reports identified by a report number such as R-253:<br/>Association of American Railroads<br/>Technical Center<br/>3140 South Federal Street<br/>Chicago, IL 60616</p> <p><b>AIAA</b><br/>American Institute of Aeronautics and Astronautics<br/>Technical Information Service<br/>750 Third Avenue<br/>New York, NY 10017</p> <p><b>AREA</b><br/>American Railway Engineering Association<br/>2000 L Street N.W.<br/>Washington, DC 20036</p> <p><b>ASCE</b><br/>American Society of Civil Engineers<br/>345 East 47th Street<br/>New York, NY 10017</p> <p><b>ASME</b><br/>American Society of Mechanical Engineers<br/>345 East 47th Street<br/>New York, NY 10017</p> <p><b>CIGGT</b><br/>Canadian Institute of Guided Ground Transport<br/>Queen's University<br/>Kingston, Ontario K7L 3N6<br/>Canada</p> <p><b>DOT</b><br/>U.S. Department of Transportation<br/>Nassif Building<br/>400 Seventh Street, S.W.<br/>Washington, DC 20590</p> <p><b>ECMT</b><br/>All documents available through<br/>OECD (see below)</p> <p><b>ESL</b><br/>Engineering Societies Library<br/>345 East 47th Street<br/>New York, NY 10017</p> <p><b>FRA</b><br/>Federal Railroad Administration<br/>400 Seventh Street, S.W.<br/>Washington, DC 20590</p> | <p><b>GPO</b><br/>Superintendent of Documents<br/>U.S. Government Printing Office<br/>Washington, DC 20402</p> <p><b>IEEE</b><br/>Institute of Electrical and Electronics Engineers<br/>Service Center<br/>445 Hoes Lane<br/>Piscataway, NJ 08854</p> <p><b>IPC</b><br/>IPC (America), Inc.<br/>205 East 42nd Street<br/>New York, NY 10017</p> <p><b>*IT</b><br/>Transport Publishing House</p> <p><b>*MPS</b><br/>USSR Ministry of Railways</p> <p><b>NAE/NAS/NRC</b><br/>National Academy of Sciences<br/>Publication Sales<br/>2101 Constitution Avenue, N.W.<br/>Washington, DC 20418</p> <p><b>NTIS</b><br/>National Technical Information Service<br/>5285 Port Royal Road<br/>Springfield, VA 22161</p> <p><b>OECD</b><br/>OECD Publications Center<br/>Room 1207<br/>1750 Pennsylvania Avenue, N.W.<br/>Washington, DC 20006</p> <p><b>ORE</b><br/>See UIC/ORE below.</p> <p><b>OST</b><br/>Office of the Secretary<br/>U.S. Department of Transportation<br/>400 Seventh Street, S.W.<br/>Washington, DC 20590</p> <p><b>RPI</b><br/>Railway Progress Institute<br/>700 North Fairfax Street<br/>Alexandria, VA 22314</p> <p><b>RTAC</b><br/>Roads and Transportation Association of Canada<br/>875 Carling Avenue<br/>Ottawa, Ontario K1S 5A4<br/>Canada</p> <p><b>SAE</b><br/>Society of Automotive Engineers<br/>400 Commonwealth Drive<br/>Warrendale, PA 15096</p> | <p><b>SNAME</b><br/>Society of Naval Architects and Marine Engineers<br/>74 Trinity Place<br/>New York, NY 10006</p> <p><b>TRB</b><br/>Transportation Research Board Publications Office<br/>2101 Constitution Avenue, N.W.<br/>Washington, DC 20418</p> <p><b>TRRL</b><br/>Transport and Road Research Laboratory<br/>Crowthorne, Berkshire RG11 6AU<br/>England</p> <p><b>TSC</b><br/>Transportation Systems Center<br/>55 Broadway<br/>Cambridge, MA 02142</p> <p><b>*TsNIITEI</b><br/>Central Scientific Research Institute of Information and Technical and Economic Research</p> <p><b>UIC</b><br/>International Union of Railways, BD<br/>14-16 Rue Jean-Rey<br/>75015 Paris<br/>France</p> <p><b>UIC/ORE</b><br/>For technical reports identified by a report number such as B125/RP3/E (note restrictions page vii)<br/>International Union of Railways<br/>Office for Research and Experiments<br/>Oudenoord 60<br/>Utrecht, Netherlands</p> <p><b>UITP</b><br/>International Union of Public Transport<br/>Avenue de l'Uruguay 19<br/>B-1050, Brussels<br/>Belgium</p> <p><b>UMI</b><br/>University Microfilms International<br/>300 North Zeeb Road<br/>Ann Arbor, MI 48106</p> <p><b>UMTA</b><br/>Urban Mass Transportation Administration<br/>400 Seventh Street, S.W.<br/>Washington, DC 20590</p> |
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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
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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  
TRIS accession number  
Subject area code

02 128640

Title

Research report abstract

### TEST TRAIN PROGRAM SIXTH PROGRESS REPORT

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

Availability

ACKNOWLEDGMENT: FRA

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  
TRIS accession number  
Subject area code

02 131315

Title

Journal article abstract

### INVESTIGATION INTO CAUSES OF RAIL CORRUGATIONS

Heavy traffic density and high-capacity cars increased wear and abrasion on 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 *AREA Bulletin* Vol. 77 Bulletin, Jan. 1976, pp 429-48, 15 Fig., 2 Tab., 7 Ref.

Source of abstract

Availability

ACKNOWLEDGMENT: AREA Bulletin

PURCHASE FROM: ESL Repr. PC, Microfilm

DOTL JC

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



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

Document record number	→	<b>09 141649</b>
TRIS accession number		
Subject area code		
Translated title	→	<b>EXPERIMENTAL ANALYSIS OF THE DYNAMIC BEHAVIOR OF A MECHANICAL STRUCTURE. CONCEPT OF MECHANICAL IMPEDANCE</b> [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 <i>Revue Generale des Chemins de Fer</i> 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	→	<b>02 058303</b>
TRIS accession number		
RRIS subject area number		
Project title	→	<b>FREIGHT CAR TRUCK DESIGN OPTIMIZATION</b>
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 053375

### **OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC. HYDRAULIC PERFORMANCE OF TRACK BED STRUCTURES AND SOIL UNDER THE INFLUENCE OF RAINFALL**

The present report summarises the results of tests by the SNCF in connection with the hydraulic performance of track bed structures and soil under the effect of rainfall. It ends with some practical conclusions as regards the dimensioning of longitudinal drainage systems. Parallel with other investigations in progress, it evaluates the water content conditions to be taken into account under various climatic conditions.

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

International Union of Railways D 117/RP 13, Oct. 1979, 37p, 30 Fig.

ORDER FROM: UIC

DOTL RP

00 053376

### **STATISTICAL DISTRIBUTION OF AXLE-LOADS AND STRESSES IN RAILWAY BRIDGES. FINAL REPORT**

The report describes the results of the theoretical and experimental studies concerning the dynamic loading of railway bridges under traffic. Statistical processing of the results made it possible to establish railway bridge load spectra and derive methods for dimensioning steel railway bridges to traffic load fatigue. The study was supplemented by tests with bridges at speeds up to 250 km/h. The individual parameters were considered in detail.

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

International Union of Railways D 128/RP 10, Oct. 1979, 57p, 20 Fig., 12 Tab.

ORDER FROM: UIC

DOTL RP

00 053384

### **BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURE. THERMAL PHENOMENA IN THE INTERACTION BETWEEN CWR AND STRUCTURE ON TWO RATP REINFORCED CONCRETE BRIDGES OF 35 M LENGTH (WITH TRACK LAID ON BALLAST AND WITH TRACK LAID DIRECT)**

This report presents the results of the measurements taken on a reinforced concrete three-span railway bridge of 35 m length with statically indeterminate structure consisting of two adjacent but independent decks, one carrying track laid on ballast and the other with track laid direct, with special Tetron type neoprene bearing devices. The report describes the variations with time of the stresses in the CWR, the variations of the forces at the bearings due to the temperature of the rails and that of the bridge, and the variations in longitudinal displacements of bridges and rails. It establishes certain correlations between these variations and analyses the results obtained. In particular, it contains a comparison table of these variations between the bridge with track laid on the ballast and the bridge with track laid direct.

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

International Union of Railways D 101/RP 16, Apr. 1980, 29p, 27 Fig.

ORDER FROM: UIC

DOTL RP

00 307538

### **TUNNEL DESIGN BY ROCK MASS CLASSIFICATIONS**

This report discusses tunnel design procedures based on various rock mass classification systems. A comparison is made between the tunnel support design based on the classical Terzaghi rock load method and the support selection based on the RSR Concept, the Geomechanics Classification, and the Q-System. These classification systems are described in detail and guidelines are given for step-by-step application of the three methods. Using an actual tunnel case history, an evaluation is made of the current design practice by comparing it with the design approaches involving the three rock mass classification systems. It is concluded that the current design practice may lead to overdesign of support, and recommendations are made for improved procedures that would ensure the construction of safe and more economical rock tunnels. Finally, a few areas are identified where more research would benefit the current tunnel design practice. The study involved the following scope of work: a. Review of existing classification systems in rock engineering. b. Provision of a user's guide for the most useful classification systems. c. Evaluation of design practices on the basis of a selected tunnel case history. d. Identification of practical steps leading to improved design of safe and more economical tunnels. e. Recommendation of research requirements needing immediate attention.

Bieniawski, ZT

Pennsylvania State University, University Park, Waterways Experiment Station Final Rpt. WES-GL-79-19, Sept. 1979, 131 p., Figs., Tabs., 47 Ref.

Contract DACW39-78-M-3114

ORDER FROM: NTIS

AD-A076540/4

00 313097

### **CONSTRUCTION OF URBAN RAIL TRANSIT SYSTEMS: THE CHALLENGE OF MORE COST EFFECTIVE CONSTRUCTION**

The goal of the conference was to seek input from the construction community on improving the use of public funds and insight into identifying new ways to control and reduce cost of construction of urban rail transit systems in the United States. The conference was organized into four sections and addressed the following topics: Transportation Overview, Transit Assistance Program, Technology Development and Deployment, and Policy; Owners' Point of View, Designers' Point of View, and Contractors' Point of View; Insurance and Bonding, Value Engineering, Construction Management; and Management R&D Review, Technology R&D Review, and Test Sections.

Conference Proceedings Held at Williamsburg, Virginia on December 7-8, 1978.

Dewey, RW

Pacific Consultants, Transportation Systems Center, Urban Mass Transportation Administration DOT-TSC-UMTA-79, Sept. 1979, 106p

Contract DOT-TSC-1526

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-130479

00 313213

### **FIELD EVALUATION OF FRACTURE CONTROL IN TUNNEL BLASTING**

The objective of this research was to implement fracture control procedures in a tunnel project and to assess the practicality, advantages, disadvantages,



performance and cost effectiveness of fracture control methods against smooth blasting procedures. This report describes the procedures and results of field tests of fracture control--a procedure for achieving fracture plane control in tunnel blasting. It describes and discusses the project and site geology, the theory and applications of fracture control blasting, and the experimental procedures used. The report provides conclusions and recommendations for future research. The procedures and results of an experimental smooth blasting round utilizing milli-second delay detonating caps are described in Appendix A.

Thompson, DE McKown, AF Fourney, WL Sperry, PE  
Haley and Aldrich, Incorporated, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-79-44, UMTA-MA-06-0100-7914, Dec. 1979, 172p

Contract DOT-TSC-1579

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-149297, DOTL NTIS

#### 00 314789

##### CUT-AND-COVER TUNNELING SUPPLEMENTAL VOLUME-CONSTRUCTION COST DATA FOUR BASIC ESTIMATES

The overall report presents a method for making comparative evaluations of cut-and-cover tunneling operations required for highway and transit construction within urban areas. It considers both the cost of construction and cost of disruption, enabling the planner to choose construction most effective for his particular requirement. This Supplemental Volume contains computer printouts showing complete cost detail for four cut-and-cover projects. It is primarily reference material for those interested in the basic details used by the study team to develop the series of 176 multiple estimates summarized in Volume 2. (FHWA)

Sponsored by DOT, FHWA, and the Office of Research and Development.

Wickham, GE Tiedemann, HR  
Jacobs Associates, (JA 167) Final Rpt. FHWA-RD-76-139, Dec. 1979, 732p

RESPONSIBLE INDIVIDUAL: Sallberg, JA (HRS-11)

Contract DOT-FH-11-8513

ACKNOWLEDGMENT: Federal Highway Administration

ORDER FROM: NTIS

PB80-185317

#### 00 315058

##### MONITORING BY AERIAL AND TERRESTRIAL PHOTOGRAMMETRY

A photogrammetric monitoring method of structural deformation has been developed during the course of this project. The method is based on a combination of aerial and terrestrial photographs. The theoretical experimentation for formulation of computer programs has been done on mathematical models. The combination of aerial and terrestrial photographs provides a 30% increased accuracy if compared to terrestrial photographs only. Practical experimentation was done on the existing Gabion Wall and it was indicated that the achievable accuracy is 1/120,000 of the photographic distance. The method is flexible if it can be used for monitoring of any type of structure as well as for aerial triangulation. (FHWA)

This study was conducted in cooperation with the Department of Transportation, Federal Highway Administration.

Veress, SA Hatzopoulos, JN  
Washington University, Seattle, Washington State Department of Transportation Final Rpt. FHWA-WA-80-38-1, Dec. 1979, 115p

Contract Y-1833

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PB80-192925

#### 00 316361

##### SPECIAL WEATHER CONDITIONS CAUSING AVALANCHES [Ekstreme Vaersituasjoner som Foerer til Skred]

This report deals with the relationship between avalanches and particular weather situations. Most types of avalanches are described; snow avalanche,

slush avalanche, rockfalls, rockslides and slides of loose deposits. For the different types of avalanches a summary of the experiences gained is given. Examples of different weather conditions which have resulted in avalanches are also given. [Norwegian]

Bakkehoei, S

Norwegian Geotechnical Institute Monograph NGI Rpt 58302-16, June 1979, 20p, 4 Fig., 3 Tab., 2 Phot., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 247022), Norwegian State Highway Laboratory

ORDER FROM: Norwegian Geotechnical Institute, P.O. Box 40 Tasen, Oslo 8, Norway

#### 00 316405

##### SCOUR AT BRIDGE PIERS-FIELD DATA FROM LOUISIANA FILES

Data from a total of 17 occurrences of scour at seven bridge sites in Louisiana were collected, covering the following ranges: Pier width, 3.4-10.4 m; flow depth, 1.7-19.5 m; flow velocity, 0.46-1.8 m/s; Froude number, 0.067-0.189; scour depth, 3.4-10.4 m, and bed material median diameter, 0.008-0.06 mm. An analysis of the relative scour depth with respect to relative flow depth for flows with Froude numbers about 0.1 shows that the scour depth increases rapidly with an increase in flow depth when the relative flow depth is less than 0.5. The rate of increase then slows down to approach a constant value of 0.8 maximum as the relative flow depth approaches 1.3 and may tend to decrease very slightly as the relative flow depth increases further. For the data where the Froude numbers were about 0.1, Shen's formula II (2) yields the best agreement. Three of the other popular formulas-Laursen's, Shen's formula I and Neill's approximation of Laursen's design curve-tend to overpredict the scour, and three formulas-Ingles-Poona's, Ahmad's and Chitale's-tend to underpredict the scour for these low Froude numbers. (FHWA)

Chang, FFM

Tye Engineering Company, Federal Highway Administration Final Rpt. FHWA-RD-79-105, Jan. 1980, 34p

RESPONSIBLE INDIVIDUAL: Jones, JS (HRS-42)

Contract FHWA P.O. 8-3-0129

ORDER FROM: NTIS

PB80-195613

#### 00 316406

##### SCOUR AROUND BRIDGE PIERS

Available theories and prediction formulas on scour at bridge waterways are reviewed. Formulas that offer potential for prediction of scour around bridge piers are compared by reducing each formula to a non-dimensional form that includes Froude Number, the ratio of scour depth to pier width, and the ratio of stage to pier width. A field study to gather data on scour and related variables is described. The study is aimed at collecting field data in order to furnish a basis on which to compare scour prediction formulas. Four test sites are included in the study. These sites are located on: 1) the Red River in Shreveport, Louisiana; 2) the Brazos River in Richmond, Texas; 3) the Homochitto River near Brookhaven, Mississippi; and 4) the Ohio River in Lawrenceburg, Indiana. An automatic instrumentation system that measures scour depth at three points around a bridge pier as well as river stage is used in this study. The system is based on a depth measuring fathometer. Also, a mobile scour measuring system is discussed. This discussion includes the design of a prototype and field trials. The test protocol and study philosophy are discussed. Data gathered from the field sites are presented and compared to values predicted from scour formulas. Recommendations are made on ways to improve the scour research effort. These include improved instrumentation systems, additional field studies, laboratory studies and computer program development. (FHWA)

Hopkins, GR Vance, RW Kasraie, B

West Virginia University, Federal Highway Administration Final Rpt. FHWA-RD-79-103, Feb. 1980, 141p

RESPONSIBLE INDIVIDUAL: Jones, JS (HRS-42)

Contract DOT-FH-11-7759

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PB80-195449



00 318485

**FIELD EVALUATION OF ADVANCED METHODS OF SUBSURFACE EXPLORATION FOR TRANSIT TUNNELING**

This report presents the results of a field evaluation of advanced methods of subsurface exploration on an ongoing urban rapid transit tunneling project. The objective of this study is to evaluate, through a field demonstration project, the feasibility, applicability, reliability, and cost effectiveness of selected advanced methods of subsurface exploration and instrumentation to produce data usable for rapid transit tunnel design and construction within the time, cost, and schedule constraints common to the industry. Numerous methods of subsurface exploration, including hole advancement techniques, sampling procedures, and geophysical logging tools, were used to predict stratigraphy within a test section on an urban rapid transit project under construction. A test section on the Massachusetts Bay Transportation Authority Red Line Extension-Northwest, Cambridge, Massachusetts, was selected to evaluate methods of subsurface exploration used to investigate stratigraphy, ground water levels, bedrock structure, and other geotechnical parameters. The site represents a typical urban setting with the test section located under a major, four-lane divided street, with structures adjacent on both sides.

Prepared in cooperation with Haley and Aldrich, Inc., Cambridge, MA.

Thompson, DE Humphrey, JT Young, LW, JR Wall, CF  
Bechtel Corporation, Transportation Systems Center, Urban Mass  
Transportation Administration Final Rpt. DOT-TSC-UMTA-80-1,  
June 1980, 405p

Contract DOT-TSC-1570

ACKNOWLEDGMENT: NTIS  
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PB80-200496

00 318975

**MECHANICAL TUNNELING IN SOLID ROCK. TRANSLATION**

Although machines tunneling originated in the United States (1856) and was used with great success, it has since been used in other countries, namely, Europe where the greatest density of tunnel boring machines can be found today. This report is a complete translation of the German book *Mechanischer Tunnelvortrieb im Festgestein*, and it represents the first comprehensive work on mechanical tunneling cutting (tunnel boring). The emphasis herein is on mechanical tunnel boring in medium and high-strength as well as in abrasive rock, and thus on full face excavation of radially symmetric cross sections. This document is intended for construction managers, design and project engineers, as well as for students. This report introduces the principles of mechanized tunneling and provides detailed guidelines for practical application. The subject is introduced with a detailed review of technical aspects and terms relating to mechanized tunneling. It discusses the mechanics of rock cutting and implications on machine performance. Two related issues--the stability of underground openings and rock mass classification for tunneling--are presented and serve to familiarize the reader with aspects other than rock cutting that affect machine tunneling. All this forms the basis for a comprehensive description of the entire mechanized tunneling system and its operation. The report also provides recommendations for bid preparation and project execution as well as a discussion of application limits.

Trans. of mono. *Mechanischer Tunnelvortrieb im Festgestein*, Duesseldorf (Germany, F.R.) 1974, by K. H. Morehouse, H. Einstein, and R. Robbins.

Rutschmann, W  
Eidgenoessische Technical University, Switzerland, Urban Mass  
Transportation Administration, Transportation Systems Center Final  
Rpt. DOT-TSC-UMTA-79-40, May 1980, 245p

Contract DOT-TSC-1281

ACKNOWLEDGMENT: NTIS  
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PB80-221013

00 319359

**ROCK-SLOPE STABILITY ON RAIL TRANSPORTATION PROJECTS**

This paper summarizes the factors that contribute to instability of rock slopes, outlines methods of control of instability, and describes examples of instability and stabilization. The factors that contribute to instability of rock slope include geologic conditions, groundwater, climatic conditions, blasting

effects, train vibration, and earthquakes. The methods of control considered include (a) stabilization by excavation or resloping, drainage, surface stabilization, and construction of support systems; (b) protection; and (c) construction of warning systems. (Author)

This paper appeared in *Transportation Research Record No. 749: Embankment Stabilization and Soil Mechanics*.

Brawner, CO *Transportation Research Record No. 749*, 1980, pp 58-67, 24 Fig., 3 Tab., 5 Ref.

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00 319638

**SETTLEMENT-INDUCED FORCES IN CONCRETE BRIDGES**

This paper presents a mathematical model for evaluation of differential settlement-induced forces in non-prestressed continuous concrete bridges taking into account the effects of creep, stress relaxation, and time rate of settlement. A force induction factor is derived by which the elastic solution of settlement-induced forces should be multiplied to obtain the viscoelastic solution. A mathematical model is developed for ease of computation and is applied to two numerical examples. The results of these examples, and others not presented for lack of space, show clearly the necessity of including the time rate of settlement of different supports in the computation of settlement-induced forces.

Bishara, AG (Ohio State University); Jang, S-Z *ASCE Journal of the Structural Division* Vol. 106 No. 7, July 1980, p 1423, 8 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

00 319639

**PROJECT MANAGEMENT--PULLING IT ALL TOGETHER**

The project management organization and relationships for the Metropolitan Atlanta Rapid Transit Authority and its General Engineering Consultant are reviewed in summary form. No new innovative managerial techniques are developed. Primary organizational mechanisms which provided for control and coordination during the first billion dollar phase of the rapid rail system are examined. Several important project decisions are presented to illustrate the framework for decision making on complex public projects.

Lammie, JL (Parsons Brinckerhoff/Tudor); Shah, DP *ASCE Journal of Transportation Engineering* Vol. 106 No. 4, July 1980, pp 437-451

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 319684

**CULVERT INSPECTION--PART I: EXAMINING THE MAIN STRUCTURE**

Regular culvert inspection insures that water may flow safely through an embankment, locates any weakness in the culvert structure, and assures that there are no changes in the watershed which may affect flow as well as detecting possible environmental impacts. Inspection procedures are detailed for concrete, timber, metal and masonry culverts with attention to structural and foundation strength, embankment stability and other factors.

Uppal, AS (CN Rail) *Railway Track and Structures* Vol. 76 No. 5, July 1980, pp 28-30, 3 Phot.

ORDER FROM: ESL

DOTL JC

00 319689

**THE FREEZING EXPEDIENT**

The article discusses the development of artificial ground freezing as an aid to tunnelling construction in unconsolidated strata particularly when below ground water table. Strata types and the depth to be reached determines the most suitable method of placing the freezing tubes in an accurate pattern. Standard equipment uses two-stage or boosted compressors capable of reducing brine temperature to -40 deg C. An alternative refrigerant, liquid nitrogen, which evaporates at -196 deg C can deal with ground freezing operations more easily although costs can be prohibitive except for works of short duration. Details are given of a number of tunnelling projects in which ground freezing techniques were used. (TRRL)

Harris, J (Foraky Limited) *Civil Engineering* May 1980, pp 57-59, 1 Fig., 3 Ref.



ACKNOWLEDGMENT: TRRL (IRRD 248112)  
ORDER FROM: ESL

DOTL JC

00 319694

**TUNNEL-DRIVING TECHNIQUES UNTIL THE YEAR 2000**

The author surveys the various methods of rock disintegration at present being studied in research laboratories throughout the world. Many methods have been proposed including jet piercing, fusion, electronic heating, pressure waves from spark discharges, ultrasonics, laser techniques, plasma rays and water jets. He suggests that there will be no completely new and revolutionary principle for tunnelling and an evolution of current equipment is more likely. The penetration rate of drills has greatly increased since 1920. Greater automation is forecast to aid with the moving and aligning of drilling booms. Similarly, the equipment for charging explosives, scaling and spraying concrete could be automated and remotely controlled. The continuous working method of full-face boring machines can also be automated, provided tool lives are adequate. Even when an operator is necessary, he could be installed in a protected, air conditioned cab. Remote control will also have increased applications in loading work. The operation of large diesel powered rubber-tyred loaders could be electronically controlled and supervised from a central control room. The control installation would be similar to that of a modern underground transit system. Eventually very few personnel will be required in the drift or tunnel. (TRRL)

Holdo, J *Consulting Engineer* Vol. 44 No. 5, May 1980, p 57, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 248467)  
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DOTL JC

00 319695

**GEOPHYSICAL AND TELEVISION BOREHOLE LOGGING FOR PROBING AHEAD OF TUNNELS**

Laboratory and underground trials of geophysical and television logging in a horizontal borehole have been made with the object of assessing their potentiality for use in probing ahead of tunnels. The commercially-available geophysical logging methods tested were gamma-gamma (long and short spacing), natural gamma, neutron-neutron, neutron-gamma, self-potential and resistivity; in addition a commercially-available borehole television camera was tested and a new ultrasonic velocity logger was designed and used. It was concluded that: (1) of the commercially-available geophysical logging methods, only the gamma-gamma method would seem to be useful in probing ahead of tunnels: it provided a good overall measure of density; (2) the borehole television camera was most successful in showing the presence of joints, cavities and other features; and (3) the prototype ultrasonic velocity logger provided a general indication of rock strength and could readily be developed for use in routine probing ahead. (a) (TRRL)

West, G

Transport and Road Research Laboratory Monograph TRRL LR932, 1980, 39p, 13 Fig., 3 Tab., 10 Phot., 35 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 248495)  
ORDER FROM: TRRL

00 319702

**THE PARIS-SOUTH EAST HIGH SPEED TRAIN (TGV). BRIDGE OVER THE SAONE NEAR MACON [TGV Paris-Sud Est-ouvrage de franchissement de la Saone pres de Macon]**

After a description of the general characteristics of the structure and of the selection of construction techniques, the following points are discussed: (1) special aspects connected with launching; (2) construction of the deck; (3) launching of the deck; (4) general management of the site. The bridge which is 339 M long, has 7 spans and comprises a constant-height deck consisting of a trapezoidal box girder. The deck is built in successive sections of constant length on a fixed plant, and installed according to the launching technique. [French]

Chambon, E Gesta, P Magnas, JP *Travaux* No: 533-534, July 1979, pp 34-42, 9 Fig., 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109338), Central Laboratory of Bridges & Highways, France  
ORDER FROM: Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France

00 319923

**GEOTEXTILES**

An introduction, The new engineering benefit, and an article, Savings and stability, are followed by a table, Principal Properties of Geotextiles. These synthetics increase the support capacity of track foundations, separate ballast from subgrade to exclude soil particles from the aggregate, and transport rainfall laterally through the track structure to drainage ditches. This report on the state of the art indicates the range of geotextiles available, their manufacturers, and the reasons why these materials are a significant engineering development.

*Modern Railroads/Rail Transit* Vol. 35 No. 7, July 1980, 12p, 4 Phot.

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DOTL JC

00 319924

**MAINTENANCE FOR 150 MGT**

An interview with R. M. Brown, chief engineer of Union Pacific, examines track components, machinery and maintenance. He observes that U. S. railroads have made great progress in improving track conditions over the past decade; that despite progress in track maintenance machinery there is need for units capable of working off track; and that while no change is necessary in basic track technology, track components will have to be more rugged with particular attention given to rail metallurgy. Brown also discusses geotextiles, UP's increased line capacity, use of German rail on curves, the effect of high-capacity cars and personnel problems.

Shedd, T *Modern Railroads/Rail Transit* Vol. 35 No. 7, July 1980, pp 44-48, 3 Phot.

ORDER FROM: ESL

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**CULVERT INSPECTION--PART II: EXAMINING OTHER COMPONENTS**

Conditions of embankments, backfill and foundations must be appraised in checking the adequacy of existing culverts and making new installations. The stream flow should be unobstructed and of proper velocity to prevent either sedimentation or erosion. The article concludes with an 8-step inspection procedure.

Uppal, AS *Railway Track and Structures* Vol. 76 No. 6, Aug. 1980, p 42, 4 Phot.

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**ANTWERPEN'S PRE-METRO TAKES SHAPE AS CONSTRUCTION SURGES AHEAD**

Stage two of Line 1 opened on March 11 and Line 2 is being constructed using a bentonite shield to bore single-track tunnels one above the other.

Wittemans, A *Railway Gazette International* Vol. 136 No. 4, Apr. 1980, pp 279-282, 2 Fig., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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**MEASURING EQUIPMENT FOR RAPID MONITORING OF THE CLEARANCE GAUGE [Messeinrichtung zum schnellen Kontrollieren des lichten Raumes]**

Description of the measuring equipment and the way it operates. [German]

Zoder, E *Glaser's Annalen ZEV* Vol. 104 No. 4, Apr. 1980, pp 109-110, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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**INSTRUMENT FOR FAST CHECKING OF LOAD LIMIT GAUGE**

A pair of binoculars, incorporating a reference screen with engraved load limit gauge in its optical path and equipped with a sighting mechanism, permits a fast check of the loading gauge for the required clearance dimensions at construction sites or on installation of wayside objects. The instrument and its operating principle are briefly described. [German]

Zoder, E *Glaser's Annalen ZEV* Vol. 104 No. 4, Apr. 1980, pp 109-110  
 ACKNOWLEDGMENT: British Railways  
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**DSB PHOTO TROLLEY: MEASURING OF SIGNALS, BRIDGES, PLATFORM ROOFS, ETC. BY MEANS OF PHOTOGRAMMETRY**  
 The traffic superintendent has developed the mono-photogrammetric method of measuring described. The photo trolley has now been in operation for about one year. The results have been very promising, and its application has proved to reach beyond the out-of-gauge loads, among other things in connection with measuring for civil engineering projects and control of overhead wires.

*Rail International* Vol. 11 No. 5, May 1980, pp 321-330

ACKNOWLEDGMENT: British Railways  
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00 322030

# **STEEL-PACKED CONCRETE BRIDGE BOASTS LOAD-CARRYING MUSCLE**

A concrete box girder bridge under construction in Vienna that has an unusually large amount of prestressing and reinforcing steel to handle heavy loads while meeting strict esthetic requirements is described. The Danube River structure will have six traffic lanes on top and carry a rail transit track in each of its two cells. The 2,800-ft structure is fully prestressed longitudinally and vertically, and is prestressed to a lesser degree in its top and bottom flanges.

*Engineering News-Record* Vol. 204 No. 15, Apr. 1980, pp 32-33

ACKNOWLEDGMENT: EI  
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# **LAYING BALLASTED TRACK ON LATTICE GIRDER BRIDGES** [Ueberfuehrung von Gleis und Bettung bei Fachwerkbruecken]

Using 2 examples each including 4 types of profile, a study is made of the problems involved in laying track and ballast on lattice girder bridges. [German]

Kremling, L *Signal und Draht* Vol. 24 No. 2, Mar. 1980, pp 87-90, 4 Fig., 1 Tab., 1 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

00 322515

# **THE ORGANIZATION OF MECHANIZED SNOW CLEARANCE ON THE WESTERN SIBERIAN NETWORK** [Organizacija mehanizirovannoj ocistki puti ot snega na zapadno-sibirskoj zeleznoj doroge]

The booklet indicates how snow clearance is organised in the different districts of the Soviet network and describes the equipment used. [Russian]

Konoplev, BA *Put'i Putevoye Khozyaistvo* No. 1, 1980, pp 1-13, 4 Fig., 1 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

00 322526

# **CONSTRUCTION AND MODERNISATION OF RAIL BRIDGES WHILE OPERATING**

The article describes the difficulties met with when rebuilding rail bridges while maintaining operations on the lines concerned. [German]

Siebk, H *Acier/Stahl/Steel* No. 2, 1980, pp 58-65, 15 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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00 322533

# **REPLACEMENT OF CONNECTING PIN IN 520 FOOT DECK TRUSS SPAN**

Bessemer and Lake Erie Railroad contracted to have replaced two pin connections in the bottom chords of its 520-foot truss bridge over the Allegheny River near Pittsburgh, Pa. The steps in preparing for this repair to the 60-year-old bridge, reboring of the pin-connection holes and installation of the 12-1/2-inch diameter pins are described. The bridge was out of service for 19-1/2 and 15-hours for the two cycles of pin replacement.

Proceedings of the Eighty-Fourth Annual Conference of the American Railway Bridge & Building Association held October 15-18, 1979, Atlanta, Georgia.

McQuaid, DL (United States Steel Corporation)  
 American Railway Bridge & Building Association Proceeding 1979, pp 43-50, 6 Phot.

ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 322539

# **GEOTEXTILES: A MAGIC CARPET FOR WET ROADBEDS**

Soft and unstable roadbeds, aggravated by heavy traffic loading, are increasingly being stabilized by using the variety of geotextiles that are now available. The evolution of these polymeric materials, woven or unwoven, and their adoption by the railroad industry are discussed. The fabrics can function to separate subgrade and ballast, to filter so that soil cannot move into the ballast, to reinforce track structures, and to aid in drainage. Methods of installation, manufacturers' activities, and possible limitations are also covered.

Dick, MH *Railway Age* Vol. 181 No. 17, Sept. 1980, p 70, 5 Phot.

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# **INTERIOR SUPPORT STIFFENS EMBANKMENT RENEWAL**

The Clinchfield Railroad has made the first reinforced earth installation under a North American railroad in the course of restoring an aging and unconsolidated earth embankment in North Carolina which failed after heavy rains. The reinforced earth slide buttress was found to be a cost effective and permanent answer.

Goforth, JA (Clinchfield Railroad Company); Elias, V (Reinforced Earth Company) *Railway Track and Structures* Vol. 76 No. 9, Sept. 1980, p 32, 2 Fig., 3 Phot.

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# **MODERN "GEO-TECHNIQUES" EASE TRANSIT TUNNELING**

The Baltimore Region Mass Transit Project has built 4-1/2 miles of tunnel, much of which is in the congested downtown area. This subway construction has involved shield tunneling, drill-and-blast, cut-and-cover, and slurry-trench walls. Linings utilized include prefabricated steel panels and precast concrete liners. Silica-based grout stabilized soil in a number of locations.

Middleton, WD *Railway Track and Structures* Vol. 76 No. 9, Sept. 1980, pp 44-46, 4 Phot.

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# **TYNESIDE/REPORT 8. PART 2: CONSTRUCTION**

This article describes the constructional features of the new sections of the Tyne and Wear Metro. The largest is the 2.1 km long tunnel from Jesmond, under central Newcastle, to Forth Banks. Tunnel diameters are 4.75 M compared with London's 3.85 M. Tunnelling operations were complicated by the need to underpin the foundations of Newcastle Central Station and the need for compressed air in pockets of water-bearing sand. Twin 800 M long bored tunnels beneath Gateshead are flanked by cut-and-cover sections at each end. Two new bridges have been built. The through-train bridge over the River Tyne was chosen because it was strong, economical and of compatible appearance with the four existing bridges. The 815 M long Byker viaduct spanning a difficult side over a steep sided valley, was the first to



use glued segment concrete cantilever construction in the UK. The viaduct has 18 spans and 253 precast deck segments. The Monument station, at the centre of the Metro, has been built in stages and roofed over to keep at least half the street open for buses and pedestrians. For abstracts of parts 1 and 3 of this article see IRRD nos 248772 and 248774.

Haywood, PG Price, JH *Modern Tramway and Light Rail Transit* Vol. 43 No. 510, June 1980, pp 188-193, 1 Fig., 7 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 248773)

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

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00 322794

#### CHECKING GAUGE CLEARANCE BY LASER ECHOES

Experiments have been carried out in Austria to develop a method of tunnel clearance measurement accurate within 10 mm. The technique uses a measurement of time interval between transmission of a laser impulse and the return of an echo; a prototype machine has been used to measure cross-sections and longitudinal sections on the Arlberg line. Further development is in progress with the prospect of establishing computer programs to check routes for oversize loads automatically.

Riessberger, K *Railway Gazette International* Vol. 136 No. 10, Oct. 1980, pp 864-866, 3 Fig., 2 Phot.

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00 322806

#### PROBABILISTIC STABILITY ANALYSIS OF EARTH SLOPES

A method of probabilistic analysis of three-dimensional limit equilibrium stability of long earth slopes is presented and its application to earth embankment design is discussed. The method accounts for the spatial variability of the shear strength. It is in principle capable of accommodating frictional and cohesive components of shear strength as well as a spectrum of drainage conditions. The probabilistic model predicts that slope failure events involving very long or very short widths of the failure zone are highly improbable. The paper evaluates the probability of a sliding failure at a specific location, as well as the risk that a failure will occur anywhere along a slope of given total length.(a)

Vanmarcke, EH (Massachusetts Institute of Technology) *Engineering Geology* Vol. 16 No. 1-2, July 1980, pp 29-50, 10 Fig., 21 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249468)

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#### A SIMPLE MECHANICAL MODEL FOR ROCKSLIDES AND AVALANCHES

A simple mechanical model for rockslide and avalanche investigations in the form of an ordinary second order differential equation describing the motion of the mass center of a "slide" has been derived from basic physical principles. The basic model is rigorous; no empirical assumptions have been introduced. However, the resultant of external forces must be known in some detail before investigation of slide phenomena can proceed. In this regard, reasonable assumptions are possible because the precise distribution of body forces in the slide mass and tractions on the potential slide surface are not required, nor are constitutive assumptions needed because the description of the mass center motion is independent of the assumption of deformability. Indeed, disintegration of the slide mass or not is of no unanswerable consequence for the model. Of particular interest is the quantitative analysis of rockslide and avalanche "triggering" under conditions that previously represented stability. Finally, the basic model of a rock mass as an assemblage of individual bodies shows, at least in principle, that the often-heard objection to the application of continuum mechanics to rock is not well founded despite the numerous practical difficulties encountered in rock mechanics and engineering practice.(a)

Pariseau, WG (Utah University) *Engineering Geology* Vol. 16 No. 1-2, July 1980, pp 111-123, 4 Fig., 4 Tab., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249466)

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#### BR/SNCF PROPOSAL FOR A SINGLE TRACK CHANNEL TUNNEL

In an examination of BR/SNCF proposal for a single track channel tunnel, the author first reviews the history of the previous schemes. The latest proposal provides for a 6 M diameter running tunnel connected by cross-passages to a 4.5 M diameter service tunnel, the tunnels being at 15 M centres. The track will be continuously welded rail on an in-situ concrete slab. In the running tunnel two continuous walkways will be provided should passengers have to leave the trains. Ventilation will be provided by pumping air from each end into the service tunnel to feed the running tunnel through one-way grilles in the cross-passage doors. The possibility of adding a second running tunnel in the future is catered for in the design.

Lamming, RAE (British Rail) *Tunnels and Tunnelling* Vol. 12 No. 5, June 1980, pp 71-75, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 249100)

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00 322814

#### ESTIMATION OF FATIGUE LIFE OF RAILWAY BRIDGES UNDER TRAFFIC LOAD

Random modelling of railway bridge loading enables fatigue damage to be calculated on the basis of the cumulative damage theory of Palmgren-Miner and the classification of the stress-time history by means of the "rain-flow" counting method. The results of calculations are the mean value of the damage and the standard deviation of the stresses, and thus an estimation of the bridge fatigue life. Accordingly the bridge life is dependent on the number of stress cycles and their distribution, the standard deviation of stresses, and on the shape of the Wohler curve. Bridge life increases with increasing span and decreases with an increasing traffic load. Results are presented as obtained in a detailed study of the effects on the bridge life of different parameters (vehicle speed, damping of bridge vibrations, variability in length and time of the moving load and its magnitude, number of stress cycles and their distribution). The equivalent damage method in the integral form enables one to compare the effects of the traffic loads with those of the standard loading.

Fryba, L (Railway Research Institute) *Journal of Sound and Vibration* Vol. 70 No. 4, 1980, pp 527-541, 17 Fig., 2 Tab., 16 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249377)

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#### BRIDGE PILINGS CAN BE PROTECTED; FRP JACKETS STOP DETERIORATION

The first article on this subject in the magazine (The April issue of BETTER ROADS) carried a report on the action of gribbles and corrosion on wood, concrete and steel bridge pilings in salt water installations, and a method of repair for pilings under such attack. Deterioration can also occur to an equal or perhaps even greater extent in fresh water and inland installations. This second article deals with those problems and a means of repair and control employing fiberglass reinforced plastic jackets.

*Better Roads* Vol. 50 No. 5, May 1980, p 20

ACKNOWLEDGMENT: EI

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#### GRIBBLE/BANKAI/CORROSION ACTION STOPPED WITH NEW POLYESTER SLEEVES

The article deals with the problems created by the limnoria tripunctata (the gribble) and an equally destructive marine borer, the bankia. It then discusses steps taken by the Oregon Department of Transportation to defeat the creatures as well as several studies on the original equipment and procedures one manufacturer has developed to completely stop destruction by the animals. The latter consists of a fiberglass reinforced polyester pile restoration system applicable to both salt and fresh water and for bridge or structure supports over land.

*Better Roads* Vol. 50 No. 4, Apr. 1980, p 10

ACKNOWLEDGMENT: EI

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**ECONOMIC POTENTIAL OF TUNNEL STANDARDIZATION**

An analysis was made of the economic potential of standardization in rail transit tunnel construction. The analysis shows that the potential savings from standardization is in the range of approximately 1.5% to 5.5% of construction costs, with a "most probable" savings of approximately 2% of same. Such savings, though significant, are small with the result that it may not be beneficial to pursue such savings. For example, there is no certainty that the total magnitude of the potential savings would be passed on to the owner. This paper also considers the impact of planning, design and maintenance on tunnel standardization. It is indicated that the greatest potential for cost savings is reducing the time period between initial submission of the grant application and completion of construction, due to the rapid rate of inflation. UMTA, the board of directors of local transit agencies, local politicians and citizen advocate groups are the principal potential sources of delayed decision making which must be addressed in this regard.

Hampton, D (Hampton (Delon) and Associates); McCusker, TG *ASCE Journal of the Construction Division* Vol. 106 No. 3, Sept. 1980, pp 247-265, 13 Ref.

ACKNOWLEDGMENT: EI  
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**MIXED FACE TUNNELING ON MELBOURNE UNDERGROUND**

Adequate preliminary investigation, continued monitoring of ground conditions and construction procedure by the engineer, and a resourceful contractor combined to result in the economical design and construction of a four-track (double-under-double-over) rapid transit railway project in Melbourne, Australia. One tunnel contract required a variety of heading-and-benching-type operations to overcome mixed face conditions, with the soft ground being either on top, underneath, or in the middle of the face. Close monitoring of the tunnel construction by the engineer, skillful execution of the work by the contractor, and a good specification, permitted several variations of the original design resulting in economies.

Petrofsky, AM (Jacobs Associates) *ASCE Journal of the Construction Division* Vol. 106 No. 3, Sept. 1980, pp 409-425, 6 Ref.

ACKNOWLEDGMENT: EI  
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00 322826

**TORSIONAL ANALYSIS OF CUTOUT BEAMS**

The torsional deflection analysis of uniform hollow beams having a uniform cutout and subjected to a quasi-statically moving point torque is presented. An inherent deflection discontinuity is examined and a method to eliminate this incompatibility problem is given. As a numerical example, a rectangular hollow beam used in an automated guideway transit application is studied.

De Silva, CW (Carnegie-Mellon University); Wormley, DN *ASCE Journal of the Structural Division* Vol. 106 No. 9, Sept. 1980, p 1933, 7 Ref.

ACKNOWLEDGMENT: EI  
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**NORTH DAKOTA TRAINS HAUL COAL TO POWER PLANT THROUGH A GIANT CULVERT**

The article reports on the installation of a steel plate structure 170 ft long and 28.1 ft in span width, which serves as a grade separation near Beulah, N. D. Among the points covered are factors that led to the selection of this type of structure instead of a more conventional bridge structure, site preparation, installation backfilling, and other aspects of the project and the structure.

*Better Roads* Vol. 50 No. 5, May 1980, pp 28-30

ACKNOWLEDGMENT: EI  
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**HONG KONG EXPERIMENT--A NO-FRILLS MASS TRANSIT SYSTEM**

The report deals with the new underground subway system under construction in Hong Kong, including a 1.4 km immersed tube beneath Hong Kong harbor.

*World Construction* Vol. 33 No. 1, Jan. 1980, p 86

ACKNOWLEDGMENT: EI  
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**PROTECTION OF RAILWAY LINES AGAINST FALLING ROCK. UIC COLLOQUIUM HELD ON 10, 11 AND 12 SEPTEMBER 1979 AT KANDERSTEG (SWITZERLAND) [La protection des voies ferrées contre les chutes de rochers. Colloque UIC tenu les 10, 11 et 12 septembre 1979 a Kandersteg (Suisse)]**

Methods used by the SNCF to counter this problem, as presented during the colloquium. Decisions taken by participating Railways with a view to concerted action. [French]

Verrier, G *Revue Generale des Chemins de Fer* Vol. 99 June 1980, pp 369-376, 1 Fig., 11 Phot., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
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**RESEARCH AND CONSTRUCTION OF EARTHWORKS ON THE PARIS-SOUTH EAST TGV LINE [Etude et réalisation des terrassements de la ligne TGV Paris-Sud-Est]**

Description of the methods and organisation used by the SNCF to carry out infrastructure works in as short a time as possible, and to organise all earthworking sites at the same time over more than 250 km. Examples of remarkable earthworking achievements. Follow-up and supervision of workings and sites. [French]

Verrier, G Roques, G *Travaux* No. 543, May 1980, pp 94-106, 5 Tab., 24 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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**PROTECTION AGAINST ROCK-FALLS. METHODS USED IN SPECIFIC STUDIES: APPLICATION TO THE STUDY OF THE LA PRAZ REGION ON THE CULOZ-MODANE LINE [Protection contre les éboulements rocheux. Methodologie des études spécifiques: application à l'étude de la zone de la Praz sur la ligne Culoz-Modane]**

Methods applied to specific studies relating to the dangers of rock-falls on roads or railway lines: definition of structural data, geomechanical study of dangers, definition of protective measures. Application to the study of the La Praz region on the Culoz-Modane line, and account of action taken. [French]

Rochet, L *Bulletin de Liaison des Lab des Ponts et Chaussées* No. 106, Mar. 1980, pp 57-68, 7 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Central Laboratory of Bridges & Highways, France, 58 Boulevard Lefebvre, 75732 Paris, France

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**RENOVATION OF SNCF TUNNELS, REPAIR TECHNIQUES. GENERAL FEATURES OF STUDIES AND WORK IN RAILWAY TUNNELS [Renovation des tunnels SNCF, techniques de réparation. Caracteristiques generales des études et des travaux en tunnels ferroviaires]**

First article in a series of seven planned to review the various techniques used by the SNCF to renovate and reinforce tunnels. The SNCF has 1420 tunnels, half of which date back a hundred years, and is the only main contractor in France responsible for maintaining such a large number of old tunnels. After listing a number of general points, the article describes current techniques, i.e. rejoining and injection, projected concrete and anchoring, prefabricated keystones, total rebuilding or lining, subgrade work, opening-up or deviation. [French]



Eraud, J *Revue Generale des Chemins de Fer* Vol. 99 June 1980, pp 357-368, 7 Fig., 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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#### EQUATION OF HORIZONTAL VIBRATION OF A MULTI-SPAN BRIDGE AND ITS APPLICATION TO MODEL TEST

The soundness of bridges when piers are not deeply embedded or soil is not stable is considered to be related to dynamic behavior of the piers. This paper gives an analytical method for horizontal vibration of a multi-span bridge with simple supports and then examines its application to a two-span model bridge. The effect of mass and the spring effect of loaded girders which influence pier vibration can be developed by using a simplified equivalent model.

Okada, K *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 2, June 1980, pp 57-61, 9 Fig.

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#### PLASTIC PIPE FOR SUBSURFACE DRAINAGE OF TRANSPORTATION FACILITIES

This report documents and presents the results of a study of buried plastic pipe for the drainage of transportation facilities. The overall objective of the study was to develop practical guidelines for the selection, design, specification, and installation of plastic pipe for subsurface drainage of transportation facilities. Design, installation, and performance criteria were developed, analyzed, and evaluated in order to select pipe systems suitable for the application. Ongoing state installations of plastic pipe were monitored to observe installation practice. Full-scale field tests were performed in cooperation with states to obtain realistic data on the effects of installation conditions and on pipe behavior and performance. This information is summarized herein. The documentation developed from this work presents and evaluates criteria for selection of plastic structural materials, design procedures, and installation guidelines. Guide specifications are proposed for corrugated polyethylene (PE) tubing and polyvinyl-chloride (PVC) pipe. A proposed recommended practice for installation of plastic pipe in transportation drainage applications is also presented. (Author)

Chambers, RE McGrath, TJ Heger, FJ (Simpson Gumpertz and Heger, Incorporated) *NCHRP Report* No. 225, Oct. 1980, 153p, Figs., Tabs., Refs.

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#### MODERNISATION OF THE ALIGNMENT OF RAILWAY TRACKS

The purpose of this paper is to establish a method for working out the priorities between the various expedients for modernising railway lines, with a view to increasing commercial speeds. After an analysis aimed at selecting the most suitable action to be taken, the conclusion seems to indicate that the best expedient consists of improving the horizontal path of the lines. The methodology established has been orientated in fact towards systemizing the improvements it is possible to make to the alignment by establishing a selection criterion based on the unit cost of the time saved. In this way it has been possible to formulate a logical series of options or variants for modernising the alignment, each one at a minimum cost involving an increasing level of commercial speed.

Gonzales, AC *Rail International* No. 7-8, July 1980, pp 453-460, 8 Tab.

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#### BURLINGTON NORTHERN'S NEW GILLETTE-ORIN LINE

The planning and construction of the longest piece of new mainline railroad built in the U.S. since 1932 is described. The 127-mile line from Donkey Creek to Orin, WY, consists of the northern 42 miles and spurs built in segments starting in 1972 and the final 85 miles constructed as a single project during 1978 and 1979. Project planning, environmental delays, and other facets of building this new railroad to high standards are included.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Anderson, BG (Burlington Northern, Incorporated) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 332-350, 16 Fig.

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#### RESULTS FROM CALDWELL, TEXAS GEOTEXTILE TESTS ON SOUTHERN PACIFIC

Because of evidence of the effectiveness of fabrics in track structures, but faced with a lack of knowledge of the precise mechanisms of fabric behavior in railroad applications, Monsanto Textiles approached Southern Pacific with a proposal for a full scale test program in which geotextiles would be evaluated using an instrumented track structure. A siding at Caldwell, TX, has six 300-ft test segments where four polyester and polypropylene fabrics are compared with a cement-stabilized section and a conventional track structure. Instrumentation is designed to follow loads from top of rail through the track structure and into subgrade. Fundamental mechanisms of fabric behavior are now being identified.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Barnett, T (Bidim Engineering Fabrics/Monsanto Textiles Co);

Newby, J (Southern Pacific Transportation Company) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 361-375, 6 Fig.

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00 323211

#### CONSTRUCTION OF NEW URBAN RAIL SYSTEMS

Rapid transit and light rail systems exist in numerous North American cities. A survey shows 1341 line miles in operation and details of track structures, rail weight, turnouts and crossovers on these are given. The author describes the new systems, recently opened or under construction, and then discusses expansions of existing transit properties.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Shoff, DA (Daniel, Mann, Johnson and Mendenhall) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 447-457, 2 Fig.

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#### CASE STUDIES OF TIMBER BRIDGES' PROBLEMS CAUSED BY UNIT TRAINS

At a threshold of up to 20 million gross tons, properly built and maintained wooden bridges are able to withstand unit train traffic; beyond that point the amount and severity of damage increases rapidly. The regular vibrations produced by uniform cars uniformly loaded has damaged stringers, pile caps, bents, and the piles themselves. Stepped up inspections are essential to assure safe, economical operation and possible steps to repair and resist damage are described.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Fish, A *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 532-535

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#### EFFECT OF UNIT TRAINS ON CONCRETE RAILROAD BRIDGES

Unit trains can have detrimental effects on concrete railroad structures built 50 years ago or more. Foundations can be inadequate and settling may damage elements; many bridges may have inadequate or no steel reinforcement; concretes may not be uniform or have developed internal stresses or be weathered so they are readily damaged; and there can be problems with bearing plates, anchor bolts and other metal components.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Christenson, T *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 536-537

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**ANALYSIS OF A BOX FRAME WITH A UNIT LIVE LOAD MOVING ACROSS THE SPAN ON ITS TOP AND THE CORRESPONDING SOIL PRESSURE ACTING AT ITS BOTTOM**

Design of a box-frame underpass for pedestrians or highway vehicles is described. The general moment equations are developed for such a concrete slab structure with the unit live load of locomotives and cars moving across the top span and corresponding soil pressures acting on the bottom of the frame. The method of slope deflection is used to analyze the box frame.

Tien, YC (Taiyuan Railway) *AREA Bulletin* Vol. 82 No. 679, Sept. 1980, pp 21-28, 1 Fig., 1 Tab.

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00 323221

**SOUTHERN ENGINEERS THE FABRICS**

Southern Railway has installed 65 acres of filter fabric under its new Spencer yard in North Carolina to overcome problems of soil instability. This is part of the railroad's continuing program of assuring drainage and stability for trackage in both mainlines and yards which started in the 1950s. Southern began to require a densely graded aggregate as a subballast. It is now Southern practice to install fabrics where unstable conditions are experienced and regularly under turnouts and under rail and highway grade crossings. Each application requires a clear knowledge of subgrade, drainage conditions and other factors. The fabric has a long-term benefit in distributing the loads of today's increased tonnages.

*Progressive Railroading* Vol. 23 No. 9, Sept. 1980, p 86, 5 Phot.

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

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00 323348

**SOIL REINFORCEMENT SLICES TIME AND COST**

High tensile strength polymer grids were used as reinforcing materials for a wall sited on a colliery waste tip near Wakefield. Trains discharge shale from a track supported by the wall. A rigid full height facing unit connected to the reinforcing material by means of sliding couplings was used. The design of the wall was based on classical soil mechanics principles given in the document BE 3/78 and predicted that almost all the loading in the reinforcements was live. The whole area of the wall and slab forming the apron was founded on a 300 mm layer of stone reinforced with Netlon CE131. The fill was placed in 100 mm to 200 mm layers, spread and compacted with mechanical plant. One of the main advantages of a reinforced soil structure is that specialist skills such as joinery and steel fixing are not required.

*Contract Journal* Vol. 297 No. 5264, Sept. 1980, pp 26-27, 1 Fig., 4 Phot., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249863)

ORDER FROM: IPC Building and Contract Journals Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ, England

00 323350

**REINFORCED EARTH-RESEARCH AND PRACTICE**

The article reviews the proceedings of a meeting of the British Geotechnical Society which discussed reinforced earth developments. Such constructions are defined as a selected fill, strengthened by reinforcing elements and enclosed on exposed faces by interlocking concrete facing units. This type of construction provides a flexible structure able to tolerate large ground movements. The work of the TRRL is discussed in the building of model, pilot and full-scale experimental reinforced earth walls. Studies were made of the influence of construction processes and post construction loadings on the pressure, tension and deformation generated by such structures. Other TRRL studies have demonstrated that reinforced earth model constructed with a high factor of safety against adherence failure produced generally low, or zero, tension in the reinforcement close to the facing. Similar studies and development work by West Yorkshire CC, Swansea University and Ground Engineering are discussed.

*Ground Engineering* Vol. 13 No. 4, May 1980, pp 17-27, 14 Fig., 7 Phot., 11 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249856)

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DOTL JC

00 323352

**TUNNEL WATERPROOFING**

The report deals mainly with methods of waterproofing preformed segmental linings, and outlines the provisions for unlined tunnels and for waterproofing tunnels lined with concrete in-situ. The need (or otherwise) for watertightness is discussed, and recommendations are made, based upon existing evidence, for appropriate standards of permissible leakage, their formal classification, and suitable units of measurements. Factors are considered which may influence the selection of permanent waterproofing elements for a tunnel lining system, and an appreciation is made of construction expedients and temporary works which may be an equally essential part of waterproofing the tunnel. A classified list of waterproofing elements is given with suppliers' names and addresses.(a)

Construction Industry Research &amp; Information Assoc. (0305-408X)

Monograph No. 81, CIRIA Rpt 81, Apr. 1979, 55p, 39 Fig., 2 Tab., 1 Phot., 25 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249529)

ORDER FROM: Construction Industry Research & Information Assoc, 6 Storey's Gate, London SW1P 3AU, England

00 323355

**CHANNEL TUNNEL-WILL WE ACT TO END SHEPWAY'S 175 YEAR-OLD BLIGHT?**

A total of 190 hectares of land in Shepway district has not been available for development for the past 175 years while the construction of a channel tunnel has been considered. The possible need and latest proposals for a fixed channel link are at present being considered by the British government. The author reviews the history of the channel tunnel project and outlines the present alternatives which fall into four groups: single rail tunnels, double track rail tunnels, road only links and a combined road/rail link. The local council strongly supports the BR/SNCF scheme for a single 6.02 M wide tunnel, with a 4.5 M service tunnel, accommodating continental loading gauge rolling stock. The total distance between portals would be 31 miles (49.4 km) with an average journey time of 35 minutes. Emphasis is being placed on low-cost, minimum disturbance projects that could be completed within a reasonable time.

Greening, T (Shepway District Council, England) *Municipal Engineering* Aug. 1980, p 579, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 249864)

ORDER FROM: Municipal Engineering Publications, Limited, 178-202 Portland Street, London W1N 6NH, England

00 323356

**GROUND MOVEMENT AS A RESULT OF THRUST BORING THROUGH A RAILWAY EMBANKMENT**

The authors present the results of an investigation into the nature and extent of ground movement caused by tunnelling through a railway embankment near Sevenoaks, UK, using a thrust bore method. The 34 M long rectangular box culvert was constructed by jacking precast concrete sections, 3.15 M square, through the embankment at a depth of cover of about 2.5 to 3.5 m.(a)

Toombs, AF West, G (Transport and Road Research Laboratory) *Tunnels and Tunnelling* Vol. 12 No. 8, Sept. 1980, pp 11-16, 9 Fig., 5 Phot., 8 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249844)

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00 323357

**DOUBLING MEXICO CITY'S METRO NETWORK**

Details are given of some of the work being undertaken with the aid of British rigs on the scheme that will add 41 km of railway track extensions. The rigs are excavating diaphragm walls on 14 km of cut-and-cover tunnel construction. In the inherently unstable subsoil with its high water table and comprising 80% water and clay, the cut-and-cover construction is being carried out between diaphragm walls- a technique adopted in the building of the earlier metro sections. Design of the underground sections is based on a flotation equilibrium principle for the "box" that will contain the tracks and train. The description of the construction details is illustrated by means of a number of photographs of different stages of the process. A brief note is also included on the construction of the elevated lines. With predictions that the city's population is expected to treble by the year 2000, plans are in hand for further extensions to extend the metro system again, to a total of 250 km.



Patey, DR *Ground Engineering* Vol. 13 No. 3, Apr. 1980, pp 31-34, 1 Fig., 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 249718)

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DOTL JC

00 323358

#### THE HONG KONG MASS MOVEMENTS MIRACLE

The author reviews the administrative organisation concerned with the construction of the Hong Kong mass transit railway (MTR). The 26 km of railway under construction consists of 16 km of modified initial system already opened and the 10 km Tsuen Wan extension to be in operation by the end of 1982. Costs of the project and sources of finance are discussed. It is emphasised that the success of the project so far in opening on time and within the budget is due to the continuity of management planning. Although revenue for the project is partially protected by property development, this might be equalled by increasing operating costs. A successful outcome of the MTR is of importance not only to Hong Kong but also to other urban areas of the world contemplating similar systems.

Ridley, T (Halcrow Fox and Associates) *Transport* Vol. 1 No. 3, July 1980, pp 19-22, 1 Fig., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 249625)

ORDER FROM: City Press Limited, Fairfax House, Colchester, Essex, England

00 323359

#### JACKING OF LARGE UNDERPASSES-A NEW BRIDGE CONSTRUCTION MARKET? [Pressning av stora vaegportar-ny brobyggarmarknad?]

There are very few new bridges to be constructed in Sweden. A new market may be created by the fact that Swedish railways are introducing high speed trains on trunk routes, and this necessitates grade separated junctions. However, the conventional method of constructing underpasses by diverting rail traffic is unacceptable. Jacking of underpasses is now an economical method. An underpass 24.6 M long, 13 M wide and of 6 M overall depth was recently jacked underneath a rail crossing comprising 4 tracks and three sets of points. It was stipulated that rail traffic must not be disturbed and that no movement must occur in the tracks. The underpass weighing 2500 tons was cast in a Pit to the south of the railway line and was then jacked through the sandy soil. The required jacking force was 2600 tons, but the jacks and abutments were designed for a jacking force of 4000 tons. Eight hydraulic jacks, each of 1500 ton rating, were used. Standard materials were largely used for the temporary bridge structure. Large excavators were used to remove soil through the underpass. The cost of the underpass including jacking was kr 3.6 M. The total project cost including road construction was skr 6.1 M. [Swedish]

Abrahamsson, P *Byggnadsindustrin* Vol. 50 No. 18, 1980, pp 47-48, 2 Fig., 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 249570), National Swedish Road & Traffic Research Institute

ORDER FROM: National Swedish Road & Traffic Research Institute, Fack, S-581 01 Linköping, Sweden

P0545

00 324424

#### DOWNTOWN CITY SUBWAY TUNNEL FORGES MISSING COMMUTER LINK

Problems associated with the construction of a 1.7-mile cut-and-cover concrete tunnel in downtown Philadelphia, Pennsylvania on track for a run to completion in 1984 are discussed.

*Engineering News-Record* Vol. 204 No. 22, May 1980, pp 22-23

ACKNOWLEDGMENT: EI

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00 324425

#### SLIDING TIMBERING CONSTRUCTION METHOD FOR ELEVATED GIRDER BRIDGE

Sliding timbering structure system described was used in planning and designing of the Tohoku Shinkansen project in Japan which is under execution for the prevention of vibration and noise caused by the running of trains to inhabitants along railroads. The comparison of characteristics

of the various types of sliding timbering system, mainly by their adaptabilities to erection work in the curve section or in the grade section is summarized.

Yorino, T (Japanese National Railways) *Civil Engineering in Japan* Vol. 18 1979, pp 40-51

ACKNOWLEDGMENT: EI

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00 324433

#### CORROSION PROTECTION AS SEEN BY AN ENGINEER IN A LARGE ORGANISATION

The selection of a surface coating requires a realistic consideration of all the factors affecting the coating, both chemical and non-chemical, and including future maintenance where required. This paper deals, in the main, with the non-chemical side. The problems are illustrated by the example of some railway bridges and attention is drawn to the importance of local effects and of actual conditions which cannot always be forecast.

Corrosion in Civil Engineering, Proceedings of the Conference, London, England, February 21-22, 1979.

Goodman, DF (British Railways)

Institution of Civil Engineers Proceeding 1979, pp 11-21

ACKNOWLEDGMENT: EI

ORDER FROM: Telford (Thomas) Limited, Publications Division, 26-34 Old Street, London EC1V 9AD, England

00 324491

#### PANEL DISCUSSES RAILROAD CROSSING EASEMENTS

Easements for utility crossings of railroad rights of way are discussed from three standpoints--the legal aspects of condemnation law and the difficulty of just compensation for so-called partial interests; the utility problems with compensation for permanent easement or rental to be paid for occupation of railroad property; and the railroad approach of assuring a safe crossing of its property and of establishing a valuation for such access as the basis for a proper fee schedule.

Van Towle, H Turi, M *Right of Way* Vol. 27 No. 5, Oct. 1980, pp 29-34

ORDER FROM: International Right of Way Association, 6133 Bristol Parkway, Suite 270, Culver City, California, 90230

DOTL JC

00 324501

#### MODERNISATION OF THE ALIGNMENT OF RAILWAY TRACKS

The purpose of this paper is to establish a method for working out the priorities between the various expedients for modernising railway lines, with a view to increasing commercial speeds. After an analysis aimed at selecting the most suitable action to be taken, the conclusion seems to indicate that the best expedient consists of improving the horizontal path of the lines. The methodology established has been oriented in fact towards systemizing the improvements it is possible to make to the alignment by establishing a selection criterion based on the unit cost of the time saved. In this way it has been possible to formulate a logical series of options or variants for modernizing the alignment, each one at a minimum cost involving an increasing level of commercial speed.

Gonzales, AC *Rail International* Vol. 11 No. 7-8, July 1980, pp 453-460

ACKNOWLEDGMENT: British Railways

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DOTL JC

00 324505

#### A NOVEL METHOD TO SURVEY THE CLEARANCE OF RAILWAY LINES

A novel method is described to survey the structure gauge on rail lines by using laser-radar equipment working contactless and without reflectors. The results so far achieved are described. [German]

Riessberger, K *Eisenbahningenieur* Vol. 31 No. 9, Sept. 1980, p 387

ACKNOWLEDGMENT: British Railways

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

00 324506

**INFLUENCE OF THE GRADE OF PRESTRESSING IN RELATION TO THE MATERIAL ECONOMY OF THE CONSTRUCTION OF RAILWAY BRIDGES**

At the German State Railway (DR) the bridges from prestressed concrete are calculated with full prestressing. In the paper presented, the possibilities to economize prestressing steel by variation of the grade of prestressing, which were ascertained by comparison calculations, are described. Proposals are made to calculate prefabricated superstructures for railway bridges with limited or partial prestressing in dependence of the kind of loading. The safety and the durability of the bridges are not impaired in this manner. [German]

Hoepfner, M *DET Eisenbahntechnik* Vol. 28 No. 8, Aug. 1980, pp 328-331

ACKNOWLEDGMENT: British Railways

ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

00 324881

**SOME IDEAS FOR REDUCING SUBWAY CONSTRUCTION COSTS**

This article presents the conclusions of a major study made during the past few years of both U. S. and European practices in building subways. Among the key conclusions: Planners and designers should consider making subway stations and subway-tunnel diameters smaller. Subway stations alone can account for up to 80% of the subway cost. The people-carrying capacity of the system shouldn't be larger than necessary. Less restrictive specs on such things as the amount of leakage of water permissible into the tunnel could substantially reduce cost. Other things that could cut cost include better written contracts and better overall project management.

O'Rourke, TD (Cornell University) *ASCE Civil Engineering* Vol. 50 No. 11, Nov. 1980, pp 41-44

ACKNOWLEDGMENT: EI

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00 324922

**PROTECTION AGAINST ROCK FALLS ON AUSTRIAN RAILWAYS [Steinschlagschutz bei den Oesterreichischen Bundesbahnen]**

Protection against rock falls has been a problem for the Alpine sections of Austrian Railways ever since they were constructed. Outside the Alpine regions, there are also other areas where such rock falls may occur. The wooden barriers formerly used are now replaced by modern techniques such as anchoring devices in the rock, injection of concrete barrier netting made of steel cables. At particularly dangerous points, special covered galleries must be constructed. Television is used for constant monitoring. [German]

*ÖBB-Journal* No. 2, 1980, pp 31-34, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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

00 324929

**DEVELOPMENT OF REINFORCED ROADBED**

A high proportion of JNR's lines are laid on earth structures such as embankments and cuts. Earth structures are comparatively inexpensive and easy to repair or restore in the event of natural disasters. On the other hand they are subject to subsidence and mud pumping under the heavy rainfall conditions frequently occurring in Japan, and thus require considerable maintenance work. Because of a tighter labor situation, frequency and density of traffic and higher standards necessary for high-speed operation, JNR has developed two kinds of reinforced roadbed, which are described in this article.

Kouya, M *Japanese Railway Engineering* Vol. 20 No. 1, 1980, pp 23-26, 4 Tab., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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00 325741

**WHAT CAN THE SNOW PLOW DO IN SUMMER? [Cto snegocistitelju delat' letom?]**

Hauling freight such as coal, minerals, peat and concrete, dirties the track very rapidly. The author examines the possibility of utilizing a two turbine snow plow to clean the complete track in summer. At this time, it's not possible to determine the effectiveness of this method. [Russian]

Arutjunjan, KG *Put'i Putevoye Khozyaistvo* No. 7, 1980, p 29, 2 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

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

00 325750

**THE TESTING OF GEOTEXTILES. SUGGESTIONS FOR A TEST PROGRAMME [Die Pruefung von Geotextilien. Vorschlag fuer ein Pruefprogramm]**

Geotextiles, i.e. textiles (woven and non-woven) used in earthworks, have achieved increasing significance in recent years. All attempts to draw up quality requirements for these materials have to assume that suitable testing procedures are available. The author introduces a Swiss proposal for a testing programme which he, together with a technical committee of the VSS, has produced. This programme consists of three sections: description, durability and mechanical qualities. It still needs to be supplemented by a programme for testing hydraulic qualities. The first section "description" encompasses construction data which do not necessarily have to be checked, such as the description of the material, the form of the components, the structure of the textile and the area weight. Within the section on "durability" are considered the tests for biological stability, resistance to ultra violet rays and resistance to chemical influences. The test for "mechanical qualities" include: determination of weight per unit area and thickness (under two different loadings), longitudinal tensile strength test (for non-wovens, also with a stretcher), ascertaining the further resistance to tearing, the falling cone test and determination of creep behaviour. [German]

Fierz, H *Strasse und Verkehr* Vol. 65 No. 7, July 1979, pp 285-287

ACKNOWLEDGMENT: TRRL (IRRD 310696), Research Association for Road Communications, W Gr

ORDER FROM: Association of Swiss Road Specialists, Seefeldstrasse 9, CH-8008 Zurich, Switzerland

00 325751

**UNDERGROUND CONSTRUCTION OF THE REINE ASTRID STATION UNDER A SCREEN OF TUBES DRIVEN IN THE SOIL [La construction souterraine de la gare Reine Astrid sous une grille de tubes fonces dans le sol]**

The covering slab of the Koningin Astrid premetro station in Anvers consists of a series of parallel cylindrical beams practically adjoining each other. These beams are obtained by driving in the soil asbestos-cement tubes in which the reinforcement is introduced before they are filled with concrete. The driving is carried out according to the technique of horizontal drilling. A concrete joint built under the soil ensures the closing of the space between adjacent cylindrical beams. Compared to conventional construction methods, this technique has the advantage of allowing traffic and commercial activities to continue on the surface during the duration of the construction operations. [French]

Rits, A Blonde Smet, H Vandervelde *Excavator* No. 422, Jan. 1979, pp 8-30, 12 Fig., 1 Tab., 12 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109866), Central Laboratory of Bridges & Highways, France, Road Research Centre, Belgium

ORDER FROM: AGRA, Rue Saint-Bernard 11, Brussels, Brabant, Belgium

00 325755

**THE BRUXELLES UNDERGROUND RAILWAY, THE USE OF COMPRESSED AIR FOR TUNNEL DRILLING [Le metro de Bruxelles, procede d'excavation de tunnel sous air comprime]**

After having briefly described the construction of a tunnel beneath the water table by means of mud walls, the author studies the geological characteristics and the permeability of the soil in the subsoil in Brussels (sand and clay). Details are given of the erection of the mud walls, of the super structure slab and in-between levels. Compressed air was used, and the method of calculating the rate of flow of the necessary compressed air is outlined. Details are given of the various preliminary tests conducted before the beginning of the works and those during construction. [French]



Hulet, F *Excavator* No. 436, Apr. 1980, pp 1-27, 11 Fig., 9 Phot.  
 ACKNOWLEDGMENT: TRRL (IRRD 109895), Central Laboratory of Bridges & Highways, France, Road Research Centre, Belgium  
 ORDER FROM: AGRA, Rue Saint-Bernard 11, Brussels, Brabant, Belgium

00 325870

**DEEP EXCAVATIONS FOR THE MEXICO CITY UNDERGROUND RAILWAY USING ELECTRO-OSMOSIS**  
 [Excavaciones profundas para el metro de la ciudad de Mexico empleando electrososmosis]

This paper describes the construction method used in deep excavations for the Mexico City underground railway, through a deposit of volcanic clays of high compressibility and very low shear strength. The soil was excavated between two parallel braced walls of reinforced concrete which had been constructed with the use of bentonite mud. Thereafter, the floor slab was constructed, followed by the inner walls and the roof slab. As the stability of the floor of the tunnel was precarious in spite of the pre-existing system of pumping wells, an electroosmotic treatment procedure was used, applied for an average of 8 days for every 31.5 M of length. The results of laboratory tests made before and after the treatment are presented. The increase in the shear strength of the clay exceeded 20 per cent, while its natural water content was reduced by only 3 per cent and subsidence in neighbouring areas did not exceed 5 cm over four months. [Spanish]

Sexto Congreso Panamericano de Mecanica de Suelos e Ingenieria de Cimentaciones, Lima, Peru, 2-7 Diciembre 1979.

Rodriguez, LB Ruelas, S Escamilla, JM  
 Comision Organizadora del VI CPMSIF Vol. 2 Dec. 1979, pp 177-187, 10 Fig., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 250227), Ministry of Public Works, Spain  
 ORDER FROM: Comision Organizadora del VI CPMSIF, Apartado Postal 11076, Lima, Peru

00 325878

**THE NEW CHANNEL TUNNEL SCENARIO. CONSTRUCTION AND OPERATION**

The construction of the single-track rail tunnel would be relatively straightforward using a 4.5 M diameter pilot tunnel to investigate ground conditions. This tunnel, connected at frequent intervals to the main tunnel, would eventually become a service tunnel. Speeds would be limited to 75 mile/h in the tunnel to avoid setting up high temperatures. It is anticipated that 60 trains a day would use the tunnel in convoys of 10 in any one direction before reversing the flow. The tunnel would be closed during six hours of any day for maintenance. The extensive safety arrangements are discussed, particularly those to guard against and deal with a locomotive fire. Driving duties in the tunnel would be shared by BR and SNCF personnel, but because of differences in operating practices the drivers would have to be changed on entering the foreign country. Alternative London terminals are evaluated to give a London-Paris journey time of 4 1/2 hours. Freeman, MC *Modern Railways* Vol. 37 No. 382, July 1980, pp 317-318, 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 250277)  
 ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

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00 325900

**DOUBLING MEXICO CITY'S METRO NETWORK**

Three basic types of construction are being employed for the new Metro extensions. Some 14km of line length is to be built at ground level, with the twin rail track mounted on a full width concrete slab to spread the loading over the relatively low bearing capacity ground. For another 9km the railway is to be elevated, carried on tapered piers 4.4m high and spaced between 25m and 40m apart. The bulk of the new extensions, some 19km of new line, will be underground installed by the cut-and-cover technique. Design of the cut-and-cover sections has been governed by experience gained in the construction of the lines built ten years ago and by the ground conditions. The article discusses machinery and techniques involved in excavating diaphragm walls for the cut-and-cover tunnel construction.

*Ground Engineering* Vol. 13 No. 3, Apr. 1980, pp 31-34

ACKNOWLEDGMENT: EI  
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00 325901

**LOAD DISTRIBUTION IN SKEWED BRIDGES TREATED IN SPACE**

Four simply-supported skewed railway bridges of the same span, but with various angles of skew, were studied. The bridges were composed of two main girders connected together by two end transverse bracings and an upper and a lower wind bracing. Maximum bending moments in the main girder, and reactions and forces in the bracings were obtained for a vertical load moving along the center line of the bridge by using the ordinary planar method of calculation, and by treating them as space structures. The maximum bending moments decrease significantly with the decrease in the angle of skew, as do the reactions at the acute end, while at the obtuse ends, a considerable increase in reaction occurs. The values of the bending moments and reactions are presented in tables as a function of the skew. The end transverse bracings and wind bracings are subject to enormous horizontal forces due to vertical loading. The calculation of these forces is possible only by treating the bridges as space structures, and they are plotted as a function of the angle of skew.

Aggour, MS (Maryland University, College Park); Aggour, MS *Journal of Civil Engineering Design* Vol. 1 No. 2, 1979, pp 185-206, 17 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: Marcel Dekker Journals, 270 Madison Avenue, New York, New York, 10016

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00 325909

**WAYS TO IMPROVE MACHINERY FOR DEALING WITH THE PERMAFROST IN BUILDING OPERATIONS** [Puti soversensstvovaniya mehanizatsii razrabotki merzlogo grunta]

During construction work on the BAM, the permafrost is dealt with by means of explosives (60 to 65 percent) and static earth crushers (15 percent). The recommended size of the clods of earth is 20 to 22 cm. But experience with explosives has shown that 75 percent of the ground thus shifted has 80 cm clods approximately. As a result, methods to reduce clod size are being sought using new techniques for placing the explosives and by using modern equipment. The author describes the new types of earth-moving machinery to be used over the next 10 to 15 years. [Russian]

Bass, BA *Transportnoye Stroitel'stvo* No. 9, 1980, pp 24-27, 1 Fig., 3 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

00 325915

**UNBALLASTED TRACK WITH LONG-WELDED RAILS ON THE NEW STRANDMOLLE BRIDGE** [Ballastlose langskinnesor pa den nye Strandmollbro]

The new post-tensioned double-track railway bridge has an unusually low constructional height counted from the underside of the bridge deck to the top of the rail. The unballasted track is laid directly on the bridge deck, and the traditional moisture isolation is replaced by a special moisture membrane. The structural height is therefore reduced by about half a meter and the bridge load by nearly 10 tons per running meter. To prevent cracks in the concrete deck owing to temperature differences between rail and concrete, the rail has been pretensioned with a force of 800 kN (800 tons) per rail before being connected to the concrete deck. The force is transferred to the bridge construction by special anchorages at the ends and at the third-part-points of the bridge. The special rail fastening system is described in a subsequent article. [Danish]

Rasmussen, M *D S B Bladet* Vol. 7 No. 4, 1980, pp 16-17, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Danish State Railways, Soelvgade 40, DK-1349 Copenhagen K, Denmark

00 325921

**A NEW SYSTEM OF MEASURING THE SIZE OF OBSTACLES ON RAILWAY LINES** [Ein neues Verfahren zur Vermessung des lichten Raumes von Eisenbahnstrecken]

The author proposed a new method for measuring the size of obstacles by means of laser radar equipment operating without contact and without reflections. He also refers to the many advantages of this equipment including its high degree of accuracy, the immediate availability of the

results, and the small space taken up by the measuring devices. [German]  
 Riessberger, K *Eisenbahningenieur* Vol. 31 No. 9, Sept. 1980, pp 387-391, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

00 325927

#### EARTHQUAKE-RESISTANT DESIGN OF RAILWAYS

Since 1973 research has been going ahead on the JNR into steps to protect against earth tremors on the Shinkansen. There are four sub-committees for soil mechanics, design, running safety and earthquake prediction. A guide was finalized in 1979 with the design of rail structures to resist earthquakes and the corresponding standards should be set in the next few years. The article deals with the basic concept and the work proposed.

Katsuhiro, O *Permanent Way* Vol. 22 No. 86, Sept. 1980, pp 3-16, 9 Tab., 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

DOTL JC

00 325934

#### THE SBS PROFILOMETER: AN EASY WAY OF MEASURING TUNNEL PROFILES [Le profilometre SBS: une mesure facile des profils des tunnels]

The device, designed by the author and built by an electronics firm, quickly plots, by means of a laser beam and a rotary mirror system, the cross-section of a tunnel in relation to a reference point linked to the track or to the vertical. This lightweight, easily employed apparatus is also useful for measuring the position of obstacles in relation to the clearance gauge. [French]

Bardes, JC *Revue Generale des Chemins de Fer* Sept. 1980, pp 505-508, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

00 325937

#### USE OF EARTH REINFORCEMENTS IN ROAD AND RAILWAY LINE CONSTRUCTION WORK [L'impiego della terra armata nelle costruzioni stradali e ferroviarie]

The author reports on experience acquired in fifteen years of use of earth reinforcements in highly varied atmospheric conditions. He then suggests various possibilities for extending the use of such techniques to other applications. [Italian]

Rinelli, S *Strade* No. 1191, July 1980, pp 347-353, 2 Tab., 7 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Permanent International Association of Road Congr, Via Andreani 4, Milan, Italy

00 326062

#### IMPROVED DESIGN OF TUNNEL SUPPORTS. VOLUME 1: SIMPLIFIED ANALYSIS FOR GROUND-STRUCTURE INTERACTION IN TUNNELING

The purpose of this report is to provide the tunneling profession with improved practical tools in the technical or design area, which provide more accurate representations of the ground-structure interaction in tunneling. The design methods range from simple analytical and empirical methods to sophisticated finite element techniques as well as an evaluation of tunneling practices in Austria and Germany. Volume 1 describes a simplified analysis method for ground structure interaction in tunneling, which is necessary because of the indeterminate relationships which describe the realm of tunneling parameters. The method is geared toward hand calculations that incorporate the effects of three of the most significant factors influencing the ground structure behavior. The authors point out that it is doubtful that the complex interrelationships among the nearly countless variables in any real tunneling problem can ever be rigorously analyzed, even using the most sophisticated numerical techniques. As an alternative approach, the simplified method focuses on the essential elements of very complicated phenomena in order to isolate the three major factors that have an overriding

influence on support loads. These factors are: (1) the relative stiffness of the support and ground mass; (2) the spatial lag or delay of support construction behind tunnel face; and (3) the yielding of ground mass as its shear strength is exceeded. Using these factors, the intent of Volume 1 is to provide an analysis in which accentuated computational ease, coupled with sufficient accuracy, makes the simplified method a valuable and effective design tool for use in preliminary design, for parametric studies in final design, and for updating the design during construction.

See also Executive Summary, PB80-134547 and Volume 2, PB80-225162. Also available in set of 5 reports PC E99, PB80-225147.

Schwartz, CW Einstein, HH  
 Massachusetts Institute of Technology, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-80-27-I, June 1980, 438p

Contract DOT-TSC-1489

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB80-225154

00 326063

#### IMPROVED DESIGN OF TUNNEL SUPPORTS. VOLUME 2: ASPECTS OF YIELDING IN GROUND-STRUCTURE INTERACTION

Volume 2 focuses on a particularly complex and often misunderstood aspect of ground-structure interaction, which is ground yielding and loosening, and reports new findings in this area. The findings are based on previous research, on the knowledge gained during the development of the simplified analysis and the application of the more sophisticated finite element techniques, and on specific studies of strain softening ground behavior. A conceptual review of ground yielding behavior, including outlines of appropriate analytical treatments, is addressed in the report and emphasis is placed on the problematic phenomenon of loosening. In addition to providing some basic concepts of ground yielding, the report also describes and compares analytical solutions for plastic ground behavior. Finally, an analytical tool for treating strain softening behavior is provided. The authors point out that it is hoped that ground-yielding, and consequently, ground-structure interaction, can be better understood and analytically treated, even if some aspects remain somewhat problematic.

See also Volume 1, PB80-225154 and Volume 3, PB80-225170. Also available in set of 5 reports PC E99, PB80-225147.

Schwartz, CW Azzouz, AS Einstein, HH  
 Massachusetts Institute of Technology, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-80-27II, June 1980, 79p

Contract DOT-TSC-1489

ACKNOWLEDGMENT: NTIS  
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PB80-225162

00 326064

#### IMPROVED DESIGN OF TUNNEL SUPPORTS. VOLUME 3: FINITE ELEMENT ANALYSIS OF THE PEACHTREE CENTER STATION IN ATLANTA

Volume 3 contains the application of the three-dimensional (3-D) finite element program, Automatic Dynamic Incremental Nonlinear Analysis (ADINA), which was designed to replace the traditional 2-D plane strain analysis, to a specific location. The location is the Peachtree Center Station in Atlanta, Georgia. The purpose of the study was to demonstrate the practical use of such a methodology. Predictions of ground movements and stresses caused by the enlargement of the pilot tunnel to form the test chamber, and by the excavation of the main station cavern are displayed. Plots of calculated stresses and deformation are shown in a form suitable for practical comparisons with instrument readings. This application of the three-dimensional finite element model is intended to illustrate some of the advantages and limitations of such methods when used for design or to compare predicted movements with measured movements. The effectiveness of the 3-D analysis for design is constrained but not excluded by the time and total cost requirements of the analysis. The potential design savings will probably outweigh the analysis costs in cases where complex ground-structure interaction cannot be realistically modeled by other methods.

See also Volume 2, PB80-225162 and Volume 4, PB80-225188. Also available in set of 5 reports PC E99, PB80-225147.



Azzouz, AS Schwartz, CW Einstein, HH  
Massachusetts Institute of Technology, Transportation Systems Center,  
Urban Mass Transportation Administration Final Rpt. DOT-  
TSC-UMTA-8027III, June 1980, 111p

Contract DOT-TSC-1489

ACKNOWLEDGMENT: NTIS  
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PB80-225170

#### 00 326065

##### IMPROVED DESIGN OF TUNNEL SUPPORTS. VOLUME 4: TUNNELING PRACTICES IN AUSTRIA AND GERMANY

Volume 4 documents and evaluates extensive information gathered on tunnel construction practices in Austria and Germany, identifies differences compared to U.S. practices, and describes new developments. The objective was to assemble all available information about the economic, contractual, and technical aspects of tunneling in these countries. The cost information includes general cost data as well as specific costs for tunnels recently constructed, and discusses the reasons why tunneling there is often more economical and technically innovative than it is in the United States. The contractual information is based on a review of contractual standards and procedures in these countries and contractual arrangements for selected projects. The technical information includes general information on design philosophy and construction procedures, and detailed information on analytical and empirical methods and design aspects. A large number of transmountain tunnels in Austria and subway tunnel sections in Germany were visited, and many discussions were held with owner-authorities, design firms, and contractors.

See also Volume 3, PB80-225170 and Volume 5, PB80-225196. Also available in set of 5 reports PC E99, PB80-225147.

Steiner, W Einstein, HH Azzouz, AS  
Massachusetts Institute of Technology, Transportation Systems Center,  
Urban Mass Transportation Administration Final Rpt. DOT-  
TSC-UMTA-80-27IV, June 1980, 469p

Contract DOT-TSC-1489

ACKNOWLEDGMENT: NTIS  
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PB80-225188

#### 00 326066

##### IMPROVED DESIGN OF TUNNEL SUPPORTS. VOLUME 5: EMPIRICAL METHODS IN ROCK TUNNELING-REVIEW AND RECOMMENDATIONS

Volume 5 evaluates empirical methods in tunneling. Empirical methods that avoid the use of an explicit model by relating ground conditions to observed prototype behavior have played a major role in tunnel design. The main objective of this volume is to provide the tunneling profession with a review of empirical methods, and to also present some guidelines on what empirical methods are best suited for observational (adaptable) tunneling procedures.

See also Volume 4, PB80-225188. Also available in set of 5 reports PC E99, PB80-225147.

Steiner, W Einstein, HH  
Massachusetts Institute of Technology, Transportation Systems Center,  
Urban Mass Transportation Administration Final Rpt. DOT-  
TSC-UMTA-80-27-V, June 1980, 557p

Contract DOT-TSC-1489

ACKNOWLEDGMENT: NTIS  
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PB80-225196

#### 00 326067

##### IMPROVED DESIGN FOR TUNNEL SUPPORTS: ANALYSIS METHOD AND GROUND STRUCTURE BEHAVIOR, A REVIEW

The report presents the results of a study on observational methods and their potential for improving tunnel design and construction. Advantages and limitations of these methods in particular regarding their application in the United States are examined and initial steps to improve the methods are presented. Specifically, the report gives a detailed description of the New Austrian Tunneling Method (NATM), the most advanced observational method. Following a review of contractual and legal issues in tunneling, an assessment is given of the technical, contractual, operational and economic

aspects of observational methods that need to be improved. The first research results providing such improvements are presented. They include a concept for less conservative empirical design methods, a comprehensive review and critique of presently available analysis methods, a simplified analysis method for preliminary design and an extensive discussion of ground structure behavior. These results which are not only applicable to observational methods and the detailed review of the NATM can be used in practice.

Einstein, HH Schwartz, CW Steiner, W Baligh, MM Levitt, RE  
Massachusetts Institute of Technology, Department of Transportation  
Final Rpt. DOT/RSPA/DPB-50-7910, May 1980, 503p

Contract DOT-OS-60136

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-225329

#### 00 326403

##### SEGMENTED CONCRETE TUNNEL LINER AND SEALANT SYSTEMS

Precast reinforced concrete tunnel support lining has been used in Europe for some time as a viable method in tunnel construction. In late 1975 UMTA sponsored a study on segmented concrete tunnel liner and sealant systems. A five-phase study plan was developed and work began in 1976. This report presents the five phases. Phase 1 consists of information gathering and review; Phase 2 consists of the development of segment liner design parameters and trade-off study; Phase 3 consists of the sealant materials and test program; Phase 4 consists of a program to test joint and sealant systems; and Phase 5 addresses the design and manufacture of liner system. The purpose of this study is to identify the design criteria for a bolted circular segmented concrete tunnel liner system; devise, fabricate and test all the components of that system; and develop specifications applicable to the tunneling industry. These specifications are to provide tunnel authorities, designers, contractors, owners, and the general public with proven data for the safe and economical implementation of segmented concrete liners for rapid transit tunnels. Reinforced concrete, a well-established structural material that can be easily designed to withstand the handling, erection, and in situ forces as a tunnel liner, presents the problem of potential leakage at segment junctures. Thus, the main objective of this effort is to identify sealant materials/systems that can demonstrate satisfactory watertightness characteristics at segmented concrete liner joints under simulated soft-ground tunnel environmental conditions.

Selander, CE Nelson, CA Jones, BV  
Water and Power Resources Service, Transportation Systems Center,  
Urban Mass Transportation Administration, (UMTA-MA-06-0100) Final Rpt. DOT-TSC-UMTA-80-31, July 1980, 358p

ACKNOWLEDGMENT: NTIS  
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PB81-105843

#### 00 329518

##### PRESTRESSED CONCRETE IN TRANSPORTATION SYSTEMS

The authors present a literature review of the current and potential use of precast prestressed concrete for pavements, railroad track systems and transit guideways.

Corley, WG Colley, BE Hanna, AN Nussbaum, PJ Russell, HG  
*Prestressed Concrete Institute, Journal of* Vol. 25 No. 3, May 1980, pp 14-31, 26 Ref.

ACKNOWLEDGMENT: EI  
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#### 00 329519

##### THIN DIVIDER KEEPS TUNNELS UNITED

The paper reports how by using a narrow, 5-ft-thick pillar to separate excavation of parallel subway tunnels in soft earth 52 ft below street level paid off for designers challenged by tight working space in Atlanta. Earth wall between bores is reported to resist cave-in or blowout.

*Engineering News-Record* Vol. 205 No. 9, Aug. 1980, p 60

ACKNOWLEDGMENT: EI  
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00 329520

**RECORD-SIZE MOLE BORES DEEP TUNNEL**

The paper reports how the slurry mole--33-ft in diameter was boring a 2,920-ft subway tunnel through soft ground in Tokyo, Japan aided by rock crushers and a maze of slurry volume and density sensors. An erector in the mole's tail placed concrete tunnel liner segments as the machine advanced.

*Engineering News-Record* Vol. 205 No. 4, July 1980, p 29

ACKNOWLEDGMENT: EI

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00 329523

**SUBWAY CONSTRUCTION COSTS: THE ROLE OF THE ENGINEER**

Methods of controlling costs through design in the underground construction of transit systems are covered. Seven types of stations were developed according to method of excavation, and cost estimates were prepared for different depths of cover to show the potential range of costs. A full-height station with mezzanine inside the train room was established as a reference. The costs of the various types of stations were found to vary as much as 100%. New construction techniques which offer cost saving opportunities are also explored as well as the importance of selecting a designer on the basis of credentials instead of fee.

O'Neil, RS (De Leuw, Cather and Company) *ASCE Journal of the Construction Division* Vol. 106 No. 4, Dec. 1980, pp 447-454, 2 Ref.

ACKNOWLEDGMENT: EI

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00 329546

**REPORTS ON IRON BRIDGE SHOE BREAKING TEST**

The paper reports the causes of the breakage of the shoe protrusions of Tohoku Shinkansens railroad bridge in Japan by the earthquake. The test described makes up a part of a series of programs intended to analyze the breaking mechanism of the shoe and to establish a more rational and economic shoe design set-up. This report is the result of efforts to clarify the resistance of the shoe of the type damaged to the static horizontal force and to discuss the process of breakage from the standpoint of static load.

*Permanent Way* Vol. 22 No. 2, June 1980, pp 5-24

ACKNOWLEDGMENT: EI

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00 329547

**FEM ELASTO-PLASTIC ANALYSIS OF IRON BRIDGE SHOE PROTRUSION**

The object of the analysis described is to suggest a shoe design procedure by assuming a stress displacement from the analysis result and the yielding condition under stress in three directions. The result of comparing the amount of distortion with test results is shown and a design formula taking into consideration the stress concentration characteristics is suggested.

*Permanent Way* Vol. 22 No. 2, June 1980, pp 25-37

ACKNOWLEDGMENT: EI

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00 329952

**RESTORATION OF SNCF TUNNELS: REPOINTING, INJECTION, DRAINAGE**

This second article on the restoration of tunnels deals with damage to the masonry, the initial preparatory work (cleaning, removing pointing) and measures taken to restore the condition of the masonry itself (repointing and internal injection) and to consolidate it (injections behind the masonry and into the soil), as well as protection against further damage by draining. [French]

Eraud, J *Revue Generale des Chemins de Fer* Vol. 99 Sept. 1980, pp 447-492

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

00 329963

**SURVEYING IN MODERN TUNNEL DRIVING [Vermessung im Modernen Tunnelvortrieb]**

The ever larger tunnel profiles required for greater track clearances for express railway lines and for 2 or 3 lane motorway tunnels, together with the desire to have a greater degree of mechanisation in tunnel construction, has necessitated new construction methods below ground. The new methods depend upon greater investigation of unknown factors and the consideration of these even at the first planning stage. In particular it is necessary for the designer, the surveyor and the contractor to work closely together so that an economic optimal solution may be achieved. At the construction stage this collaboration is even more necessary. Each of the participating parties should put himself in the position of the others and seek to understand the worries and problems of the others in the sense of interdisciplinary team work. TRRL [German]

Andraskay, E *Schweizerische Bauzeitung* Vol. 95 No. 43, Oct. 1977, pp 771-775, 10 Fig., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 311960), 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

00 329965

**REINFORCED EARTH BRIDGE ABUTMENTS IN SOUTH AUSTRALIA**

In South Australia, the Highways Department has constructed two bridges incorporating reinforced earth abutments. The first, a road overpass structure taking the Swanport deviation over the Salt Lakes district road near Murray bridge and the second, a railway overpass structure taking the National Route 1 over the standard gauge railway line near Pt. Germein. This paper outlines the basis of design of reinforced earth abutments and describes the construction of the two projects completed. Cost aspects are also discussed. Details of future bridge projects planned to incorporate reinforced earth abutments are also summarised (a). (TRRL)

National Conference Publication No. 80/2. Engineering Conference 1980. Adelaide, 14-18 April 1980.

Boyd, MS (Reinforced Earth Pty Ltd); Thomas, AI (South Australia. Highways Department) *Institution of Engineers, Australia* No. 80/2, 1980, pp 361-365, 4 Fig., 4 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 239930), Australian Road Research Board

ORDER FROM: Institution of Engineers, Australia, 11 National Circuit, Barton, A.C.T. 2600, Australia

00 329969

**DESIGN OF RAILWAY BRIDGES IN REINFORCED CONCRETE AND PRESTRESSED CONCRETE [Bemessung von Eisenbahnbruecken aus Stahlbeton und Spannbeton]**

The fatigue behaviour of reinforced concrete and prestressed concrete structures subjected to bending, shear and torsion is studied with the aid of a truss model with variable inclination of the concrete compression diagonals. Determination of the stress under working conditions is carried out in accordance with elastic theory. On the basis of the theory described a new design proposal is worked out, which has already been used on railway bridges. Design aids have been developed to facilitate design for fatigue. [German]

Grob, J *Schweizerische Bauzeitung* Vol. 95 No. 45, Nov. 1977, pp 809-817, 10 Fig., 15 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 311961), 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

00 329970

**THE CONDUCT OF A TEST ON A REDUCED-SCALE MODEL OF THE RAILWAY BRIDGE OVER THE ATLANTIC MOTORWAY AT THE ACCESS TO VIGO [Realizaci6n del ensayo en modelo reducido del puente para el ferrocarril del acceso a Vigo de la autopista del Atlantico]**

The railway bridge at the access to Vigo over the Atlantic motorway had to be constructed with strict attention to completion time. In order to study



its safety as regards cracking and failure with precision a model of the bridge deck was constructed at a scale of 1/10. For this it was necessary to make the model with micro-concrete which presented identical strength and deformation characteristics. The reinforcement consisted of wires, and the prestressing strands had the same mechanical and adhesion characteristics as those to be used for the project. The support system for the deck prototype was also similar to that of the final structure. After investigating the position of the strands it became necessary to redesign the anchorages. By means of a bending test on a deck beam of the model the process of execution of the prototype was studied, measuring instruments developed and the loading elements have been finalised. Once tests were made on the model it was possible to observe fissuration visually and the beginning of concrete fatigue at failure. Deformations were measured at each phase of the test at the point where maximum value was predicted. For the covering abstract see IRRD no 109729. [Spanish]

Delibes, A *Hormigon y Acero* No. 130/131/13, 1979, pp 106-121, 14 Fig., 8 Tab., 21 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109736), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain  
ORDER FROM: Instituto Eduardo Torroja, Costillares, Chamartin, Madrid 33, Spain

#### 00 329974

##### THE BRITANNIA BRIDGE: THE GENERATION AND DIFFUSION OF TECHNICAL KNOWLEDGE

This book reconstructs the problem solving process involved in the building of the Britannia Bridge over the Menai Straits in northwest Wales. The bridge completed the London to Dublin rail connection, and is a tubular structure of rectangular section large enough for a train to pass through, constructed of riveted wrought iron plate. It was the first encounter of engineers with thin-walled structures subject to buckling. The book traces the flow of this technology to other industries such as shipbuilding and crane construction, machine tools, commercial buildings, and structural engineering generally.

Rosenberg, N Vincenti, WG  
MIT Press Monograph 1978, 107p, Figs., Photos., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 251119)  
ORDER FROM: MIT Press, 126 Buckingham Palace Road, London, England

#### 00 329976

##### HONG KONG MASS TRANSIT RAILWAY MODIFIED INITIAL SYSTEM: SYSTEM PLANNING AND MULTI-CONTRACT PROCEDURES

This paper describes the detailed planning of the modified initial system of the Hong Kong mass transit railway including development of the plan for its implementation and the selection of the form of contract. It also deals briefly with the cost-estimating and the verification of the estimates which led to the final decision to proceed with construction. The paper sets the background for the three companion papers which describe the detailed structural design and construction of the railway.(a)

Edwards, JT Coulson, CR Chaning, CRWN (Freeman Fox & Partners)  
*Institution of Civil Engineers, Proceedings* Vol. 68 No. PT1, Nov. 1980, pp 571-598, 19 Fig., 3 Tab., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 251417)  
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#### 00 329977

##### HONG KONG MASS TRANSIT RAILWAY MODIFIED INITIAL SYSTEM: DESIGN AND CONSTRUCTION OF UNDERGROUND STATIONS AND CUT-AND-COVER TUNNELS

The paper sets out the basis on which the design and construct contracts for the underground civil engineering works for the railway were let, and refers to the assumptions on construction methods adopted by the consultants when carrying out the planning and outline design of the stations. The paper explains the extent to which contractors varied those assumptions and adopted different construction techniques to suit their own preferred methods, and their interpretation of the restraints. The design and construction of two of the stations, where the contractors selected radically different methods of construction, is described in detail.

McIntosh, DF (Freeman Fox & Partners); Walker, AJR (Mass Transit Railway Corporation); Eastwood, DJ (Kier Institute); Imamura, M

(Nishimatsu Construction); Doherty, H (Mass Transit Railway Corporation) *Institution of Civil Engineers, Proceedings* Vol. 68 No. PT 1, Nov. 1980, pp 599-626, 10 Fig., 3 Tab., 9 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 251418)  
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DOTL JC

#### 00 329978

##### HONG KONG MASS TRANSIT RAILWAY MODIFIED INITIAL SYSTEM: DESIGN AND CONSTRUCTION OF THE DRIVEN TUNNELS AND THE IMMERSSED TUBE

The first part of this paper describes the design requirements and construction methods adopted for the construction of the driven tunnels for the modified initial system of the mass transit railway. The ground conditions and methods adopted for driving the tunnels through a wide range of soil and rock types are reviewed. Particular problems encountered on the seven contracts involved are described, together with the solutions evolved by the individual contractors. The second part of the paper reviews the design principles and construction methods for the immersed tube across the harbour. The governing local conditions and other criteria are outlined and a description is given of the design and its special features. The construction method and sequence of construction are also described.(a)

Haswell, CK Umney, AR (Charles Haswell & Partners); Hall, P Hansen, FJ (Per Hall Consultants); Storey, FG Archer, GO (Mass Transit Railway Corporation); Langfield, RA *Institution of Civil Engineers, Proceedings* Vol. 68 No. PT1, Nov. 1980, pp 627-655, 18 Fig., 7 Tab., 9 Phot., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 251419)  
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#### 00 329979

##### HONG KONG MASS TRANSIT RAILWAY MODIFIED INITIAL SYSTEM: DESIGN AND CONSTRUCTION OF ABOVE-GROUND WORKS AND TRACKWORK

The first part of the paper describes the basis of selection of the type of structure for the viaducts of the elevated section of the railway, some of the problems encountered and the design and construction solutions adopted. Likewise the design and construction of the stations on the elevated section are discussed. The second part of the paper is concerned with the design and construction of the depot and particularly of the development above. This development comprises a 10 ha podium with blocks of residential flats above to house 25000 people, and a full range of commercial and recreational facilities to cater for the surrounding area. Finally the paper describes the design and construction of the track support system.

Taylor, RL Taylor, MJ (Freeman Fox & Partners); Greig, WJ (Mass Transit Railway Corporation); Couperthwaite, RF (Henry Boot-Gammon Joint Venture) *Institution of Civil Engineers, Proceedings* Vol. 68 No. PT1, Nov. 1980, pp 657-688, 9 Fig., 5 Tab., 18 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 251420)  
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DOTL JC

#### 00 329980

##### TYNE AND WEAR METRO: BYKER VIADUCT

The design and construction of the 800 M prestressed concrete, box girder Byker viaduct section of the Tyne and Wear Metro system is described. Design studies showed that for the western valley section of the viaduct piling through coal measures would be required, grouting under pier foundations to consolidate coal seams would be necessary, the valley flanks were unsuitable for founding falsework, and, the overall design should be in sympathy with existing bridge structures. The eastern Byker hill section of the viaduct required foundations in shallow pads located in boulder clay. Details are given of passenger train loadings of the structure which governed fatigue design and critical braking forces while the slow-moving works trains governed the direct bending and shear loads.

Smyth, WJR Benaim, R (Ove Arup & Partners); Hancock, CJ (Mowlem Civil Engineers) *Institution of Civil Engineers, Proceedings* Vol. 68 No. PT1, Nov. 1980, pp 701-718, 7 Fig., 6 Phot., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 251423)  
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00 329981

**TYNE AND WEAR METRO, BYKER CONTRACT: PLANNING,  
TUNNELS, STATIONS AND TRACKWORK**

The article describes the design and construction stages for the Byker contract of the Tyne and Wear Metro system. The contract includes a 550 M length of cut and cover tunnel section where the ground consists of coal measures covered by stiff boulder clay with areas of soft laminated clay. As the rocks of the coal measures were found to be standing vertically, an economical form of tunnel was adopted which consisted of thick walls of concrete case against the vertical rock face with a 200 M thick reinforced concrete arch spanning the tracks. The cement for the concrete walls contained 70% blast furnace slag and 30% portland cement. Details are given of tunnel construction methods and track laying techniques.

Smyth, WJR Benaim, R Hancock, CJ *Institution of Civil Engineers, Proceedings* Vol. 68 No. PT1, Nov. 1980, pp 689-700, 3 Fig., 1 Tab., 4 Phot., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 251424)

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01 313203

**TRACK GEOMETRY MEASUREMENT BY HIGH-RAIL VEHICLES**

This report examines the capabilities of a high-rail track survey vehicle to assist in improvement of the track safety inspection program; and assist in data collection for transportation planning. The project examines both technical and operational aspects of high-rail vehicle usage as an inspection service and as a data collection tool. This research project found that measurements of track geometry collected by a high-rail vehicle could be modeled to match measurements collected by a train type vehicle. This finding opens the door to wide utilization of the less costly, highly mobile, easily scheduled, high-rail survey vehicle. This report is a document which outlines the crew requirements, costs, scheduling procedures, reliability and accuracy levels that are associated with the operation of a high-rail track survey vehicle. This report is intended for use by railroad management, state railroad planners and federal railroad planners who may be interested in the operation of a high-rail track survey program.

Sherfy, MA

Iowa Department of Transportation, Federal Railroad Administration  
Final Rpt. FRA/ORD-78/55, Nov. 1979, 204p

Contract DOT-FR-64243

ACKNOWLEDGMENT: NTIS

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PB80-145857, DOTL NTIS

01 318423

**U. S. TRANSIT TRACK ASSESSMENT AND RESEARCH NEEDS**

The overall objective of the study is to help expand and systematize the current search for improvements in transit track. The study was initiated to identify new technology and research tasks that may help increase the performance, reliability, and safety of urban rapid transit systems, and to help ensure that track research provides maximum benefits to the transit industry. Track problems and practices were investigated at transit properties in the United States, and technology was studied in the transit industry and other industries in the United States and Europe. Throughout the study, information was sought on the best technological practices currently available and on improvements that may be obtained through systematic research. This report describes track conditions; current practice in track design, construction, maintenance, and inspection; potential opportunities for improvements; favorable technology that is available but not commonly used in transit track systems; and research and support tasks to fill identified needs. The report also describes the evaluation of research and support tasks for relative importance, the analysis of their costs and benefits, and a recommended implementation plan for a track research program.

Prepared in cooperation with London Transport International Ltd. (England).

Cunney, EG Boyd, PL Woods, JA

ENSCO, Incorporated, Transportation Systems Center, Urban Mass  
Transportation Administration Final Rpt. DOT-TSC-UMTA-79-41,  
Dec. 1979, 211p

Contract DOT-TSC-1502

ACKNOWLEDGMENT: NTIS

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PB80-196892

01 319303

**RAIL RESEARCH: MEETING THE CHALLENGE OF MODERN TRAFFIC LOADING**

The current trend in the railroad industry toward heavier cars and increased wheel loads and the subsequent effect of this trend on rail are discussed. Because of the increased loadings, the replacement criterion for rail in main-line tangent track has changed from rail wear to initiation of rail fatigue defects. An analysis of field data shows that this initiation of fatigue defects is a function of both wheel load and rail size. Rail research in North America and its thrust toward improving and extending rail service life are also discussed.

This paper appeared in Transportation Research Record No. 744, Railroad Track and Facilities.

Zaremski, AM *Transportation Research Record* No. 744, 1980, pp 1-6,  
8 Fig., 26 Ref.

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DOTL JC

01 319304

**EVALUATION OF RAIL BEHAVIOR AT THE FACILITY FOR ACCELERATED SERVICE TESTING**

Results of two experiments conducted at the Facility for Accelerated Service Testing to investigate the wear and defect behavior of various rail metallurgies under unit train operations are presented. Five types of rail were used: standard carbon, high-silicon, head-hardened, chrome molybdenum, and fully heat-treated. The load demarcation between the two experiments was at a traffic loading of 122 million gross Mg (135 million gross tons). In the first experiment, a condition of underlubrication existed up to 36 million-41 million gross Mg (40 million-45 million gross tons), after which point lubrication could be described as generous, a condition maintained throughout the second experiment. Railhead profile measurements taken in both experiments revealed that head-hardened and chrome molybdenum rail exhibited the best resistance to high-rail curve wear. In the first experiment, there was a strong lubrication-metallurgy interaction that caused the premium metallurgies to benefit less than standard rail from generous lubrication. In the under-lubricated condition, the 1:14 tie-plate cant produced about 20 percent more gage-face and head-area loss than the other cants. The cant effect was considerably reduced by generous lubrication. Position-in-curve effects were dependent on the level of lubrication. When generous lubrication permitted the accumulation of greater loads on the rails, fatigue failure became the dominant failure mode in both railhead and weldments. Standard rail exhibited the greatest number of failures from railhead fatigue.

This paper appeared in Transportation Research Record No. 744, Railroad Track and Facilities.

Hargrove, MB Mitchell, FS Steele, RK Young, RE *Transportation Research Record* No. 744, 1980, pp 6-15, 8 Fig., 11 Tab., 6 Ref.

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01 319305

**DEFORMATION BEHAVIOR OF RAIL STEELS**

The cyclic deformation behavior of three rail steels was determined under conditions of uniaxial plane-strain compression. Two loading programs were used: (a) one load (simple loading) for the entire test and (b) two loads (split loading) in which the load was increased at set intervals during the test. The results for simple loading showed that the steel softened under cyclic compression; i.e., for a constant stress, compressive cyclic loading caused an increase in strain. Increasing the applied stress increased both the rate and the amount of softening. Rails with higher hardness and yield strength showed an increase in deformation resistance. Split loading produced either increased or decreased resistance to deformation, depending on the type of steel. An equation is presented that can be used to predict the expected amount of plastic flow in rail in service.

This paper appeared in Transportation Research Record No. 744, Railroad Track and Facilities.

Stone, DH Marich, S Rimnac, CM *Transportation Research Record* No. 744, 1980, pp 16-21, 15 Fig., 1 Tab., 9 Ref.

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01 319306

**NONDESTRUCTIVE TESTING OF RAILROAD RAIL**

Techniques of nondestructive testing (NDT) of railroad rail in service are reviewed with the aim of assessing the state of the art and future needs. The contributions to the industry of the primary NDT methods--ultrasonic and magnetic inspection--are noted, and their limitations are examined. The limitations of ultrasonic inspection include ensuring the coupling of the ultrasonic signal into and out of the rail, setting the sensitivity level of the inspection system reproducibly, and relating the amplitude of the return ultrasonic signal to the size of the defect. Magnetic inspection is generally limited to the railhead. The two systems used together provide the most reliable inspection, the magnetic system providing special assistance with defects located near the edges of the railhead. Recommendations for improving rail NDT include greater use of these two complementary systems (now available on only about 50 percent of U.S. rail test cars), greater attention to operator training and characteristics and to the inspection of new rail before installation, and changes in government regulations that will

lead to more effective use of rail test cars. In addition, research is needed to relate defect growth to rail service conditions so that realistic decisions can be made about leaving defective rail in use. Developments leading to improved technology are also discussed.

This paper appeared in *Transportation Research Record No. 744, Railroad Track and Facilities*.

Berger, H *Transportation Research Record No. 744, 1980, pp 22-26, 5 Fig., 24 Ref.*

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#### 01 319307

##### REVIEW OF RAIL RESEARCH ON BRITISH RAIL

The rail research program of British Railways, which is aimed at understanding and reducing the severity of various mechanisms of rail failure, is described. An important part of the work is the measurement and prediction of rail stresses and the study of force-free temperature for continuous welded rail. To reduce failure problems, it is necessary to develop laboratory-based techniques to assess the performance of rail steels and welds. This requires a knowledge of the dynamic and static stress environment of the rails and computer programs to calculate these stresses. The study of failures includes the study of Thermo and flash-butt weld failures, tache ovale defects, star cracks at bolt holes, and squat defects. It has been found that the majority of Thermo weld failures can be attributed to poor welding practice. Flash-butt weld failures are much less frequent but may become more of a problem as the more wear-resistant rail steels are introduced into welded track. The need to develop better steels for switch and crossing work has provided an impetus to develop a weldable austenitic manganese steel and also bainitic steels of high strength and toughness. These developments are reviewed.

This paper appeared in *Transportation Research Record No. 744, Railroad Track and Facilities*.

Frederick, CO Jones, EG *Transportation Research Record No. 744, 1980, pp 26-37, 10 Fig., 2 Tab., 18 Ref.*

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#### 01 319308

##### DILEMMA OF DIRECT-FIXATION FASTENING SYSTEMS

A short, nontechnical discussion of the shortcomings of present direct-fixation fastening systems is presented. The state of the art is reviewed, and some suggestions are made on corrective solutions to existing problems.

This paper appeared in *Transportation Research Record No. 744, Railroad Track and Facilities*.

Hamilton, WR *Transportation Research Record No. 744, 1980, pp 37-40, 1 Ref.*

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#### 01 319309

##### COMPARISON OF PERFORMANCE OF WOOD-TIE FASTENERS AT FAST

The results of experiments with wood-tie fasteners at the Facility for Accelerated Service Testing are reported. Since the beginning of the use of 91-Mg (100-ton) freight cars, there has been an increasing problem with wood-tie fasteners. The resulting high axle loads have caused an increase in the deterioration of wood ties from spike killing and tie-plate cutting and have taxed the cut-spike fastener to the limit in preventing rail roll-over and wide gage. The objective of the wood-tie fastener tests at the Facility for Accelerated Service Testing is to find an alternative to the cut spike that would alleviate some of the problems that have occurred in revenue service. Two test cycles have been completed, and a third is currently being run. In the first test, an excessive amount of rail wear, attributed to high flanging forces and a lack of effective lubrication, resulted in two rail transpositions. The rail was regaged each time, which eventually "spike killed" the ties. In the second test, in the elastic-clip segments, a large number of the hold-down fasteners failed, which resulted in wide gage. This led to a redesign for the current test to incorporate four hold-down fasteners, twice as many as in the second test. The results have not yet demonstrated that there is a wood-tie fastening system that will perform better than the cut spike. The results of the third test, however, may change this conclusion.

This paper appeared in *Transportation Research Record No. 744, Railroad Track and Facilities*.

Moody, HG *Transportation Research Record No. 744, 1980, pp 40-46, 17 Fig., 2 Tab.*

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#### 01 319310

##### DEVELOPMENT OF AN ANALYTICAL APPROACH TO TRACK MAINTENANCE PLANNING

Current research being conducted in a joint effort by the Consolidated Rail Corporation and the Federal Railroad Administration to develop an integrated maintenance-of-way planning model is reported. To develop a rational plan for maintenance-of-way expenditures, it is necessary to predict the effect of increased "basic" track maintenance on the requirement for "discretionary" maintenance. Basic (routine) track maintenance is performed by small, labor-intensive section and subdivision gangs. Discretionary track rehabilitation is performed by large, mechanized track maintenance gangs that move about the track system. Basic-maintenance gangs generally complete a particular task at a higher unit cost than discretionary-maintenance gangs. The frequency of the discretionary-maintenance cycle varies as some function of the level of basic maintenance—i.e., as the level of basic maintenance is reduced, the interval between discretionary-maintenance cycles is shortened. The limiting case, in which basic track maintenance is restricted to complying with safety requirements, requires the most frequent performance of discretionary maintenance. For various reasons, it is generally desirable to fund basic maintenance at a level greater than this minimum.

This paper appeared in *Transportation Research Record No. 744, Railroad Track and Facilities*.

Fazio, AE Prybella, R *Transportation Research Record No. 744, 1980, pp 46-52, 8 Fig., 10 Ref.*

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#### 01 319685

##### RTA PRESIDENT EXAMINES WOOD TIE "SHORTAGE" QUESTION

Railroads' inconsistent cross-tie procurement practices contribute to problems of supply and price; adequate hardwood stumpage is not part of the problem. Suppliers can no longer afford inventories to meet sudden demand increases. Comments are included on current quality control, need for changes in wood treatment, and improved technology to meet more severe service demands including hybrid wood ties produced by recycling, laminating and use of special inserts. There is also need for greater cooperation in producing an adequate rail fastener for wood ties.

*Railway Track and Structures Vol. 76 No. 5, July 1980, p 32, 1 Phot.*

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#### 01 319920

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

The computer program ARTS for the static linear or non-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. The program allows the calculation of contact forces between two structures (i.e. the ground and the tie/rail system). There are two techniques for describing the material non-linearity. Triaxial test data for ballast or granular material may be processed in a cubical spline form to allow for variable Young's modulus and Poisson's ratio, or a hyperbolic model may be employed. This permits the program to take into account the ballast's stress path dependence and its no tension characteristic. A typical sample analysis has been selected to demonstrate the general problem solving procedure and the input and output descriptions.

Raymond, GP Turcke, DJ Siu, DW  
Canadian Institute of Guided Ground Transport, Transport Canada  
Research and Development Centre, Association of American Railroads  
Technical Center CIGGT Rpt. 79-20, TP 2603, Apr. 1980, 80p, 12 Fig., 1 Tab., 5 App.

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01 319933

**THE CONCRETE TIE: PERFORMANCE ROUND-UP**

An update on the performance of concrete cross ties on four railroads--Santa Fe, Chessie, Norfolk and Western, and Canadian National--and at DOT's Fast Track is followed by a report on AREA's new Committee 10 to deal with this technology. AREA specifications will be examined to determine if strength, spacing and fasteners are proper.

Weber, JW *Railway Track and Structures* Vol. 76 No. 6, Aug. 1980, p 26, 4 Phot.

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01 319934

**CONCRETE TIE FASTENER MANUFACTURER PROVIDES INTERNATIONAL OVERVIEW**

While Portec is U.S.-based, it is looking to Australasia as a market for its new direct fixation system, the Sidewinder, which has been designed for concrete cross ties but may also be used with wood. First cost of concrete ties is the same as that of wooden ties in Australia; North American prospects look promising. Research leading to the combination of tie pads and rail fasteners is discussed.

*Railway Track and Structures* Vol. 76 No. 6, Aug. 1980, p 32, 6 Phot.

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01 319935

**DEVELOPING A STANDARD TRANSIT TIE...**

UMTA, through Transportation Systems Center, has sponsored development of universal concrete cross ties for North American transit track. Design, preparation of preliminary specification and laboratory testing extended from 1975 through 1979. Two types, a monoblock and a two-block design, were developed which could be used with any of three fastener systems. Field testing was delayed when it was found U.S. transit track specifications would not accommodate the "standard" ties and possible alterations are being studied.

Witkiewicz, PJ *Railway Track and Structures* Vol. 76 No. 6, Aug. 1980, p 38, 1 Phot.

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01 319945

**RAILWAYS OPT FOR HEAVY EQUIPMENT**

A general review of some of the equipment used for track maintenance by BR, Amtrak, the SNCF, SJ and the DB.

*International Railway Journal* Vol. 20 No. 3, Mar. 1980, p 34, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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01 319946

**TWENTY-FIVE YEARS OF ON-TRACK RAIL INSPECTION AT THE SNCF; A NEW GENERATION OF RAIL INSPECTION VEHICLES [25 ans de controle des rails en voie a la SNCF. Une nouvelle generation de vehicules d'auscultation]**

After reference to the characteristics of the SNCF's first two track inspection vehicles, the authors describe two new ultrasonic detection cars with mini-computers to process the data: they are the SNCF V 3 inspection coach and the self-propelled VUR 404 vehicle supplied by Matix. In two years a new two-unit self-propelled vehicle with a travelling speed of 140 km/h, an operating speed of 40-50 km/h and selective fault detection built by the SNCF and Matix Industrie in collaboration, will be put into service. [French]

Lachaze, P Prasil, B *Revue Generale des Chemins de Fer* Apr. 1980, pp 211-222, 25 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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01 319952

**IMPROVING TRACK SUPERSTRUCTURE WITH A VIEW TO**

**INCREASING AXLE LOADS [A vasuti palyan a foldmkorona teherbirokepesszegenek novelese vedoreteg es muanyagreteg beepitesevel]**  
The author examines different ways of improving the track formation subgrade and track superstructure by using plastic protective layers under the ballast and various mixtures of ballast with sand and other materials. [Hungarian]

Unyi, B *Kozlekedestudomanyi Szemle* Vol. 29 No. 7, July 1979, pp 293-298, 4 Tab., 5 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Lapkiado Vallalat, Lenin korut 9-11; 1073 Budapest 7, Hungary

01 319956

**BUILDING TRACK FOR LONG LIFE AND LOW MAINTENANCE**

M. Alias, Director of Way and Works on the SNCF and responsible for track maintenance, signalling, telecommunications equipment and electrical installations on the SNCF, gives an outline of the SNCF's views in the areas concerned.

*International Railway Journal* Vol. 20 No. 4, Apr. 1980, p 36, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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01 319957

**144 METRE RAILS ARE REQUIRED FOR THE AUTOMATIC****BLOCK [Il blocco automatico vuole rotaie de 144 metri]**

To avoid problems such as weld cracking on lines equipped with automatic block, studies have shown that it is advisable to use 144 metre long welded rails. [Italian]

Montanari, LF *Tecnica Professionale* No. 12, Dec. 1979, pp 14-15, 2 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Collegio Ingegneri Ferroviari Italiani, Via Giolitti 34, Rome, Italy

01 319960

**PROTECTIVE MEASURES TO BE APPLIED WHEN USING LASER APPLIANCES [Schutzmassnahmen bei de Anwendung von Lasergeraeten]**

The author describes the protective measures to be taken when handling laser appliances, especially in the sphere of civil engineering and land-surveying. [German]

Fink, E *Eisenbahningenieur* Vol. 31 No. 4, Apr. 1980, pp 139-144, 1 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

01 319995

**TRACKED MACHINES FOR BALLAST CLEANING**

Ballast-cleaning machines were first used in 1930 to relieve the track gangs of heavy manual labour, to speed the work and reduce costs. Now the diversity of machines used on the DB, six ballast-cleaning machines for tracks, three for switches and one two-way machine is to be reduced in the future. The RM 80-UHR ballast-cleaning machine for tracks has been developed to DB specifications for a wider working range, and the ZRM 77 two-way ballast cleaning machine will be employed for tracked and non-tracked working in tracks and switches. The RM 80-UHR machine has monitoring and recording equipment for easier working and improved quality control. The ZRM 79 machine will be controlled by a guide wire during nontracked working. These two complementary machine types will supersede older designs and will make for more economical cleaning in conjunction with loading equipment for removed material. [German]

Riebold, K *Eisenbahntechnische Rundschau* Vol. 29 No. 5, May 1980, p 337

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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01 319996

**TEN YEARS AFTER THE DB'S DECISION TO ADOPT THE UIC 60 RAIL**

Present performance on the DB can be attributed in high degree to the predominance of the UIC 60 rail profile on the main passenger and heavy freight lines. This shows that the decision ten years ago to adopt the 60 kg/m rail was a correct one. Experience so far as well as carefully-made forecasts also indicate that the use of the UIC 60 rail helps reduce the annual upkeep costs for the permanent way. An even better result is expected from use of the heavier rails at switches, which are the weak link in the track system. With switches the tendency to positional errors is substantially reduced, which contributes to smoother vehicle movement and a reduction in track maintenance costs. [German]

Naue, KH *Eisenbahntechnische Rundschau* Vol. 29 No. 5, May 1980, p 327

ACKNOWLEDGMENT: British Railways

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01 319998

**MEASURING AND CORRECTING OF THE TRACK GEOMETRY**

Track maintenance is at present done almost entirely with tamping, levelling and lining machines. For the planning of this work, the Netherlands Railways (NS) use the measured results obtained with the French-built Mauzin recording car. The measurement signals, which are stored on a magnetic tape during the measuring run are subsequently evaluated in a PDP computer. The standard quality analysis consists of the calculation of standard deviations over track lengths of 200 metres, while for short test sections a Fourier analysis is also made. For the planning of track maintenance work, it is not only the absolute track quality which is of importance, but also the degree or rate of quality deterioration. The latter calls for high measuring accuracy and good reproducibility of the measurement signals, which is still a problem with many recording cars. In order to assess the work of track maintenance machines on the basis of fixed points or equalization, the measuring range of the recording car must be sufficiently large, i.e., up to wave lengths of at least 50 metres. Only a few recording cars, such as those of British Rail, are capable of this. For proper planning of track maintenance, one must also know the extent to which the maintenance machines improve the track quality. There is also the question of whether the machine is to work on the fixed-point or equalization system, and also whether it would be profitable to use laser equipment. These matters have been examined both theoretically and experimentally in the ORE expert Committee D 117, and some of the results as well as the main conclusions are presented in this article. [German]

Esveld, C *Eisenbahntechnische Rundschau* Vol. 29 No. 5, May 1980, p 351

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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01 322004

**DETECTION OF FLAWS IN RAILS BY AUTOMATED DIGITAL INTERPRETATION OF PATTERNS IN THE ULTRASONIC INSPECTION SIGNALS**

The railways of several countries now use arrays of ultrasonic probes on moving vehicles for inspection of rails. The vehicle used by British Rail has equipment to enable recording of all of the ultrasonic signals on 35 mm film for subsequent interpretation, formerly visually. A digital computer system has been developed for automated scanning and interpretation routines have now been incorporated in an all-digital system using the same vehicle. The new system includes a computer installed on the test vehicle together with specialized electronic instrumentation for digital preprocessing of the ultrasonic signals and a magnetic tape unit.

Machine-Aided Image Anal, Papers from the International Conference on the Application of Machine-Aided Image Anal, University of Oxford, England, September 4-6, 1978.

Hawker, BM (AERE, England) *Institute of Physics Conference Series* No. 44, 1979, pp 326-334

ACKNOWLEDGMENT: EI

ORDER FROM: Institute of Physics, 47 Belgrave Square, London SW1X 8QX, England

01 322194

**ON THE NONDESTRUCTIVE IN-TRACK MEASUREMENT OF LONGITUDINAL RAIL FORCES**

This paper presents the current state of the art for the nondestructive measurement of longitudinal rail forces. The development of longitudinal forces through temperature changes, various installation practices, train acceleration or braking, and rail creep is discussed. A distinction is made between those stresses that produce a net force, and those, such as residual stresses, which do not. Current evaluation and measurement techniques, including field "judgements," mechanical and electric-resistance strain gauges, and a British Rail force-measuring transducer are presented, and the associated practical problems evaluated. Recent research programs, in such areas as rail vibration, X-ray diffraction and ultrasonic wave propagation, are discussed. It is noted that preliminary tests at the Association of American Railroads, using the lateral rail head vibration response technique, appear promising. The paper concludes with a comprehensive set of requirements for a practical force measuring system for use in the railroad industry.

Zarembski, AM

Association of American Railroads Technical Center Tech Rpt. AAR R-407, June 1980, 33p, 12 Fig., 18 Ref.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 322522

**EXPERIENCE WITH BEECHWOOD SLEEPERS IN A DRY CLIMATE [Erfahrungen mit Buchenschwellen im ariden Klima]**

Experience with beechwood sleepers impregnated with tar oil, which have been in use since 1978 on certain sections of track in Saudi Arabia. [German]

Schulz, G *Die Holzschwelle* Vol. 75 No. 90, Mar. 1980, pp 18-27

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Studiengesellschaft fuer Holzschwellen-oberbau EZ, Waldstrasse 11, 5300 Bonn-Ippendorf, West Germany

01 322531

**ON THE USE OF ELECTRO-OPTICAL DIGITAL MEASUREMENT RECORDERS IN TRANSPORT [Zum Einsatz von elektro-optischen digitalen Messwertaufnehmern im Verkehrswesen]**

A contactless process for measuring spacing and movements. Application for measuring dynamic play of the track and track inspection. Direct numerical calculation of values to be measured. Figure coding. Consideration on transmitter coding. Representation of a recorder operating with absolute coding. [German]

Guenther, M Kretschmer, A *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 27 No. 1, 1980, pp 107-120, 13 Fig., 1 Tab., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

01 322532

**STUDY OF TRACK BED MEASURING TECHNIQUES BY MEANS OF MOTIVE UNITS TRAVELLING OVER OPEN-CAST MINE RAILWAYS [Messtechnische Untersuchungen der Gleislage mittels Triebfahrzeugen in rueckbaren Tagebaugleisen]**

Use of the EL 3 motor tractor as a measuring vehicle in direct operation. Based on the kinematic data of the bogie, an evaluation can also be made of the usual characteristics of the track bed from the angular modification of the axles in respect of the bogie frame. The measuring system and experimental results are described. [German]

Mrowka, J *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 27 No. 1, 1980, pp 99-106, 5 Fig., 1 Tab., 2 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

01 322538

**HOW CN STRETCHES ITS M/W DOLLAR**

As Canadian National experiences its greatest traffic growth in the West, it is confronted with double tracking in mountainous terrain and with maximizing track capacity of existing single-track routes by strengthening



track structures and minimizing track maintenance requirements. One entire subdivision and all severe mainline curves are now on concrete cross ties; alloy-steel rails are also routinely installed. CN has established track maintenance planning and backed this up with management information systems to maximize productivity of its track facilities and track maintenance forces.

Malone, F *Railway Age* Vol. 181 No. 17, Sept. 1980, pp 65-67, 2 Phot.

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#### 01 322542

##### PRODUCTION STRATEGY SPEEDS L & N SPOTWORK

Mud pumping and contaminated ballast on the heavy-traffic 42-mile stretch of the Louisville and Nashville mainline out of Atlanta, Ga., were the most serious problems prompting a complete track rehabilitation. The planning and management of the maintenance project involved a "window" each day when trains were rerouted or held to give track forces unrestricted access to the line. The procedures and equipment utilized are described.

*Railway Track and Structures* Vol. 76 No. 9, Sept. 1980, p 38, 1 Tab., 5 Phot.

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#### 01 322556

##### USE OF LONG WELDED RAILS OVER BRIDGES

At present, use of LWR on girder bridges is limited to spans varying from 60 m to 100 m. This is a major constraint in extending the length of individual LWRs. From an analysis of the stresses in LWR on girder bridges, it is shown that LWR can be used on girder bridges on any span provided rail fracture is prevented by adoption of suitable techniques.

Thomas, PO *Rail International* Vol. 11 No. 6, June 1980, pp 397-400

ACKNOWLEDGMENT: British Railways

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#### 01 322557

##### PROBABILITY AND COST ANALYSIS OF TACHE OVAL FATIGUE DEFECTS IN TANGENT AND CURVED TRACK UNDER HEAVY AXLE LOAD CONDITIONS

The tache oval or transverse defect is shown to be the limiting factor controlling the economic life of rail on tangent track. An approximate fracture mechanics analysis is presented which indicates the relative importance of the various applied loads causing non-metallic inclusions to grow. The probability distributions of actual failures from tangent and curved track are presented. These distributions supply data for the economic analysis which determines the optimum or minimum cost time to re-rail tangent track.

Townend, PH *Rail International* Vol. 11 No. 6, June 1980, pp 388-396

ACKNOWLEDGMENT: British Railways

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#### 01 322558

##### A METHOD OF AUTOMATIC TRACK MEASUREMENT

In an age of ever increasing train speeds, track measurement is a matter of special importance. The methods so far used have been based on feeler contact techniques and are therefore subject to wear. They are also practicable at only relatively low speeds. The article deals with a contactless system with evaluation electronics which measures the track gauge at almost any required speed. It can also be used for measuring the conductor rails of underground railways. A complete track measuring system based on this method is described. [German]

Schuller, R *Eisenbahntechnische Rundschau* Vol. 29 No. 6, June 1980, p 433

ACKNOWLEDGMENT: British Railways

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#### 01 322575

##### INTERACTION BETWEEN TUNNEL OPENINGS DUE TO VIBRATION EFFECTS

A major field of interaction effects in the case of openings used as underground railway tunnels covers the dynamic effects due to vibration caused by moving trains in tunnels. The dynamic loads may be caused by high speeds or high loads but low speeds. The main reasons for such high dynamic loads are the irregularities or nonuniformities in the track, the effects of bad joints, the propagation of track error due to bad rails and the wavy surface created by corrugated rail profile. These dynamic loads may induce vibrations either in vertical mode or in rocking mode. This paper presents the results of the steady state dynamic analysis of tunnels due to moving trains. The analysis is limited to vertical vibrations.

Numerical Methods in Geomechanics, Proceedings of the International Conference, 3rd, Vol. 2, Aachen, Germany, April 2-6, 1979.

Valliappan, S (New South Wales University, Australia);

Chandrasekaran, V Lee, IK

Balkema, AA 1979, pp 685-696

ACKNOWLEDGMENT: EI

ORDER FROM: Balkema, AA, P.O. Box 1675, 3000 BR Rotterdam, Netherlands

#### 01 322790

##### THE DIRECT FIXATION FASTENER AT WORK

Today's trains impose not only higher mechanical loads on track but vibrational inputs which, even when of short duration, are capable of damaging track components. The direct fixation (or resilient) fasteners developed with concrete cross ties or slabs are characterized by a clip which changes the dynamic characteristics of the entire track structure. The problem of lift in the track must be countered in the design of the fastener system. Because the clip generates only toe load to prevent longitudinal rail movement and to prevent separation of rail and tie, the tie pad controls the spring rate of the assembly and must be carefully selected. The author says further work must be done to resolve dynamic response of the track system.

Hamilton, WR *Railway Track and Structures* Vol. 76 No. 10, Oct. 1980, pp 28-34, 1 Phot.

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#### 01 322792

##### SLACK-QUENCHING OF RAILS USING TWO-STAGE FLAME HEATING

A heavy-haul mineral railroad in Brazil uses rail hardened by the slack-quenching process. This involves two-stage heating with a gas flame to insure the formation of fine pearlite, a process that was optimized by laboratory tests before being applied in the field. After preheating to 500 deg C, the rail head is heated rapidly to 1000 deg C before being cooled by compressed air. A fine pearlitic structure of uniform Hv370 hardness is obtained.

*Railway Gazette International* Vol. 136 No. 10, Oct. 1980, pp 858-860, 6 Fig., 2 Tab.

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#### 01 322793

##### COMPUTER ANALYSIS OF RAIL FLAW DETECTOR SIGNALS

After a decade of experience with train-borne Wells-Krautkramer rail flaw detection equipment capable of continuous scanning at 32 km/h, British Rail decided to convert scanning of the resulting film from manual to computer analysis. Programs were written to do this, but the scanning rate achieved was slow. When signals were recorded on magnetic tape instead of film, it was possible to speed the scanning rate. Signals are now analyzed on board the track inspection train in real time so that suspected tache ovale defects may be marked instantly by a paint spray.

Cope, GH (British Rail) *Railway Gazette International* Vol. 136 No. 10, Oct. 1980, pp 861-863, 6 Fig.

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01 322797

**THE CASE FOR TOTAL RENEWAL**

The selective method of track maintenance used throughout North America is called outdated and costly. Track renewal, or out-of-face, maintenance involves complete rehabilitation of the track structure in a single, continuous operation. This European technology, now used by 25 systems around the world, involves a series of machines that sled or clean ballast, change ties and rail, and line track in one continuous process. In addition to economic benefits, including incentives for installing concrete cross ties, there is improved track quality, improved worker safety, and enhanced utilization of both labor and equipment.

Burns, DR *Modern Railroads/Rail Transit* Vol. 35 No. 9, Sept. 1980, pp 38-42, 4 Phot.

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01 322916

**MEASURING DEVICE FOR CORRUGATION [Congegno per la commisurazione dell'usura ondulatoria]**

Description of a method for measuring rail corrugation by means of direct measurement of the differences in level between the ridges and cavities of the wear. An oscillating frame with a natural low frequency has been designed for the purpose. The article also gives an account of theoretical study of the system dynamics, and includes results of tests carried out on laboratory models. [Italian]

Tosatto, G *Ingegneria Ferroviaria* No. 4, Apr. 1980, pp 351-356, 10 Phot., 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
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01 322932

**USE OF NEW RAIL FASTENINGS WITHOUT PLATES, BUT WITH AUTOMATICALLY ADJUSTED SPRING CLIPS [Uj, alatlemez nélküli, onzaro szoritorugos sínleeresítőkialakítása]**

An account of research work into rail fastenings carried out by the Railway Construction department of the Budapest Polytechnical University. The work culminated in the development of a new system, which has been subjected to various tests, the results of which are given in the article. [Hungarian]

Horvath, A *Közlekedestudományi Szemle* Vol. 30 No. 2, Feb. 1980, pp 74-79, 1 Tab., 12 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Lapkiado Vallalat, Lenin korut 9-11, 1073 Budapest 7, Hungary

01 322938

**FIELD TRIAL OF PROTOTYPE "CYCLONE SWITCH HEATER" ON CP RAIL SWITCH AT STURGEON FALLS, ONTARIO**

Points operating is made difficult by snow and ice in winter, with resulting breakdowns. The Cyclone switch heater, which supplied heated air to critical areas, has been subjected to 5 years of experimentation. This report describes the results of the test at Sturgeon Falls, Ontario (CN), analyses problems encountered and proposes appropriate solutions. This prototype has proved on the whole to offer adequate protection.

Coveney, DB  
National Research Council of Canada UIC Cat. 54 N 82, Dec. 1979, 15p, 10 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
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01 322941

**THE DISTRIBUTION OF STRESS MEASURED IN RAIL FLANGES AND ITS INFLUENCE ON THE CALCULATION OF MAXIMUM STRESS [Rozkłady naprężeń mierzonych w stopkach szyn i ich wpływ na obliczenie naprężeń maksymalnych]**

Maximum probability norms are developed for rail stress and an analysis made of examples of stress distribution on S49 rails on wooden ties traversed by different types of locomotives. Coefficients of the variations of stress were measured. Method was developed for calculating maximum stress probab-

ity and comparison made of the stress distribution under different experimental running conditions. [Polish]

Baluch, H *Drogi Kolejowe* Vol. 2-26 No. 10, Oct. 1979, pp 274-281, 7 Fig., 4 Tab., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Drogi Kolejowe, Warsaw, Poland

01 322983

**SYSTEMS ANALYSIS OF RAILROAD TRACK MAINTENANCE**

An initial system dynamics model of railroad operations has been developed to study the effect of government track safety policies and railroad industry trends on track conditions in particular, and railroad operations in general. The focus of the model is the determinants of track wear and maintenance. In addition, operations policies, freight volume and transportation costs, and financial factors are included for a complete treatment of the important feedback relationships surrounding track condition. The full simulation model successfully integrates a broad range of information on railroad behavior. The model has guided data collection and analysis, and aided the interpretation of unexpected results. Sensitivity analysis has identified systems variables, particularly train speed, that have the most important impact on railroad operations and the success or failure of government safety opinions.

Proceedings of the Summer Computer Simulation Conference 1979 SCSC, Toronto, Ontario, July 16-18, 1979.

Pugh, AL, III (Pugh-Roberts Associates Incorporated); Makowski, A  
American Federation of Info Processing Soc Press 1979, pp 537-543

ACKNOWLEDGMENT: EI

ORDER FROM: American Federation of Info Processing Soc Press, 210 Summit Avenue, Montvale, New Jersey, 07645

01 323188

**FIELD EVALUATION OF MAINLINE QUALITY TRACK, USING A TRACK STRENGTH TEST VEHICLE**

This report presents the results of field evaluation tests of a prototype Track Strength Test Vehicle, the DECAROTOR, on mainline quality track. The objectives of these tests were to: (a) investigate the ability of the Decarotor to evaluate the strength of mainline quality track, (b) determine if the track strength testing concept could detect differences in mainline track "strength", normally permitted by railroads, and (c) evaluate the ability of stationary load-deflection tests to determine tie or fastener conditions. The results of these tests showed that continuous track strength measurements were feasible, and could differentiate between the different levels of track strength found in both mainline and yard quality track. In addition, the system could identify weaknesses in the track, such as a cluster of ties in "poor" condition. These testing activities could be performed non-destructively, by means of a moving inspection vehicle, so that long stretches of track could be evaluated. Further testing, however, is necessary in order to demonstrate the practical value of this testing technique.

Zarembski, AM Choros, J  
Association of American Railroads Technical Center Tech Rpt. AAR R-436, July 1980, 38p, 16 Fig., 3 Tab., 6 Ref.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 323200

**ON THE FEASIBILITY OF CONTINUOUS MEASUREMENT OF TRACK GAUGE RESTRAINT**

This report presents the results of a series of gauge restraint measurement tests conducted at the Association of American Railroads Technical Center in October 1978. The objective of this test series was to evaluate the feasibility of a continuous gauge widening resistance measuring device. It was also desired to evaluate the utility of such a device for indications of general track strength as well as specific tie and fastener conditions. The initial test results indicated that by monitoring of rail head deflection or lateral loading, depending on the specific system, it appears possible to measure track strength and specifically to locate and identify ties or fasteners in poor condition. Furthermore, because of the spring back of the rails after removal of the load it appears that such testing can be accomplished with a recommendation that further testing of this measurement concept be conducted and defines specific requirements for future prototype test vehicles.

Zarembski, AM (Association of American Railroads Technical Center)  
*Rail International* No. 7-8, July 1980, pp 415-428, 10 Fig., 6 Tab., 5 Ref.

ORDER FROM: ESL

DOTL JC

01 323202

#### MAINTENANCE OF PERMANENT WAY ON USSR HEAVY TRAFFIC LINES

The world's highest freight traffic density in the USSR (37 million gross ton-km per km in 1976) involves special problems of maintenance. About 30% of the USSR network length has a freight traffic of more than 50 million ton-km and a number of double-track sections with an intensity of 100 to 120 million gross ton-km per kilometre per annum. The paper discusses some of the difficulties and problems of track maintenance due to high-intensity freight traffic.

Isaev, KS Fedulov, VF *Rail International* No. 7-8, July 1980, pp 448-452, 2 Tab.

ORDER FROM: ESL

DOTL JC

01 323209

#### NEW CAR FOR MEASUREMENT AND EVALUATION OF GAGE-WIDENING RESISTANCE OF TRACK

The development of the Track Strength Vehicle, the Decarotor, and preliminary results from its initial test program are reported. It appears to be possible to identify weak spots in track structures through continuous measurement of loaded gauge; results confirm the results of earlier Rail Spreader Tests where ties and fasteners in poor condition were identified without damage to the track being inspected. Further tests on mainline track where variance between good and bad ties and fasteners is much narrower will check the sensitivity and repeatability of this method of nondestructive testing.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Zarembski, AM (Association of American Railroads Technical Center);

McConnell, DP (Transportation Systems Center); Lovelace, WS (Southern Railway) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 402-429, 17 Fig., 4 Tab., 8 Ref.

ORDER FROM: AREA

DOTL JC

01 323212

#### NORTHEAST CORRIDOR TRACK LAYING SYSTEM

The Track Laying System, used on Amtrak's Northeast Corridor Improvement Program, represents a significant change in track work methods and maintenance philosophy. The TLS system, consisting of approximately 30 pieces of equipment and requiring 170 workers, renews all components of a track structure in the course of passage over it, including the roadbed beneath the track. As in Europe, where TLS machines originated and where they are used extensively, the goals are increased productivity, improved ride quality, and enhanced maintainability. Heart of the concept is the P-811 Track Laying Machine, or Valvaterre System, developed in Italy.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Johnson, RD *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 458-473, 16 Fig.

ORDER FROM: AREA

DOTL JC

01 323213

#### IMPROVED METHOD OF DETERMINING SIZE OF TRANSVERSE DEFECTS

Ground inspection of rail defects following identification by detector cars is performed by hand-held ultrasonic flaw detectors in the echo-pulse mode. In addition to verifying defects, their character and size are also identified. As a part of its program on cost-risk analysis of defective rails, AAR has studied these portable instruments with particular attention to transverse defects. It has been possible to characterize defects and the process would be enhanced by a programmable calculator for computing the flaw size and profile.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Rogovsky, AJ *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 474-503, 18 Fig., 2 Tab., 10 Ref., 1 App.

ORDER FROM: AREA

DOTL JC

01 323214

#### BALLAST RESEARCH

Ballast compaction and the optimum means for achieving it were studied in an FRA-sponsored research program. It was found that both crib and shoulder compaction is beneficial, but that existing machines do not achieve the same results as traffic passing over the ballast. It is concluded that the full potential of ballast compaction and vibratory compactors has not yet been reached.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Selig, ET (Massachusetts University, Amherst) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 504-520, 10 Fig., 16 Ref.

ORDER FROM: AREA

DOTL JC

01 323217

#### COMPARISON OF RAIL BEHAVIOR WITH 125-TON AND 100-TON CARS

Railroads which handle a single commodity in cars of uniform size function as laboratories to show the effect of wheel load on rail life. The conditions on heavy-haul railways throughout the world and on the FRA Fast Track are compared. The effect of wear, defect formation, and plastic flow on rail life, as a function of axle load, is evaluated and discussed.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago, Illinois.

Stone, DH (Association of American Railroads) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 576-587, 7 Fig., 3 Tab., 14 Ref.

ORDER FROM: AREA

DOTL JC

01 323223

#### CORROSION RESISTANCE FOR JOINT BONDING

Southern Railway has adopted a corrosion-resistant insulating material, a fiberglass-reinforced preform, as an economical method of making durable field replacements of slipped or failed epoxy-bonded insulated rail joints. The thermosetting plastic can be cured by field heating and its high shear strength is outperforming other possible materials.

*Progressive Railroading* Vol. 23 No. 9, Sept. 1980, p 113, 5 Phot.

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

DOTL JC

01 323234

#### THE CANADIAN NATIONAL: PART 1--WINNING AGAINST HEAVIER TRAFFIC, AXLE LOADS

Canadian National has upgraded its track structure, using welded rail almost exclusively and concrete ties on all sharp curves in heavy-traffic territory, and is relying on new equipment to install and maintain this trackage which is traversed by growing tonnages of trains consisting of high axle-load cars. CN has two sets of Track Laying System equipment which have lowered the cost of concrete tie and welded rail installation. Such mechanization has enabled CN to stabilize its m/w forces; a computer-based management information system has a vital role in assuring optimum productivity and economy in track maintenance.

*Railway Track and Structures* Vol. 76 No. 11, Nov. 1980, p 22, 5 Phot.

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01 323235

#### THE DIRECT INSPECTION OF TRACK

Having identified several modes of track failure, including gauge widening and rail overturning that involve the condition of cross ties and rail fasteners, AAR's Track Strength Characterization Program undertook to measure rail spreading as a method of nondestructive inspection. After preliminary laboratory work with a rail spreader, a vehicle was designed to perform this type of loading so that it could measure the track over which it passed. The



Decarotor (ten wheels) vehicle is capable of applying independent lateral and vertical loads to each rail and has been tested in yards and on mainline track. It appears that, with added refinement, the concept is a viable track inspection tool.

Zarembski, AM (Association of American Railroads Technical Center) *Railway Track and Structures* Vol. 76 No. 11, Nov. 1980, p 30, 3 Fig., 4 Phot.

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DOTL JC

01 323236

#### INCREASING USE OF SPIKE RETENTION METHOD

The Spikelock is a retaining device installed in wooden ties that prevents the movement of spikes under vibration and undulating action from dynamic loading of the rail. This sleeve with its "louvers" projecting in and out acts to engage both the wood fibers of the tie and surface of the spike inserted within it. Tests are under way on several railroad and transit properties.

*Railway Track and Structures* Vol. 76 No. 11, Nov. 1980, p 40, 1 Fig., 4 Phot.

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01 324404

#### PAVED TRACK FOR AUSTRALIA'S BLUE MOUNTAINS ZIG ZAG TUNNELS

The Zig Zag tunnels occupy a 5km length of double track between Mount Victoria and Lithgow on the Main West Line from Sydney to Perth. The line is built on the cliff-like edge of the Blue Mountains. It winds its way round and through various rock outcrops resulting in many reverse curves and ten tunnels. Tunnel lengths vary from 880m to approximately 50m. For many years, the Public Transport Commission (PTC) of New South Wales has been experiencing great difficulty in maintaining the track to a satisfactory standard. The solution selected was paved concrete track, which is a track system developed by British Rail (BR) in association with McGregor (Paving) Ltd. It is designed to be virtually maintenance free and experience has shown it to be highly satisfactory in service. While paved concrete track was adopted, lowering the track by 650 mm to accommodate new double-deck cars led to complications which the article discusses.

Duncan, SD *Tunnels and Tunnelling* Vol. 12 No. 4, May 1980, pp 31-35

ACKNOWLEDGMENT: EI

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DOTL JC

01 324406

#### PRESENT SITUATION OF TRAIN VIBRATION CONTROL IN TRACK MAINTENANCE--1. EXISTING LINES

This article deals with a description of activities of Japanese National Railroads track maintenance division and efforts to control train vibrations.

Sakurazawa, T (Japanese National Railways) *Permanent Way* Vol. 22 No. 1, Mar. 1980, pp 30-35

ACKNOWLEDGMENT: EI

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01 324407

#### PRESENT SITUATION OF TRAIN VIBRATION CONTROL IN TRACK MAINTENANCE--2. SHINKANSEN

The paper deals with a description of activities of Japanese National Railroads' maintenance division and the train vibration control efforts. The method of this control is shown and the part of this method which relates to the track maintenance is described.

Noda, N (Japanese National Railways) *Permanent Way* Vol. 22 No. 1, Mar. 1980, pp 36-43

ACKNOWLEDGMENT: EI

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DOTL JC

01 324486

#### STATE-OF-THE-ART REPORT ON PRESTRESSED CONCRETE TIES FOR NORTH AMERICAN RAILROADS

The extensive use of prestressed concrete ties by railroads all over the world indicates that the concrete tie has become an important constituent of the

modern railway track structure. Pretensioned concrete ties account for about 80 percent of the world's annual prestressed concrete tie production. Methods of pretensioned concrete tie fabrication, material requirements, and design considerations are presented. Requirements for rail fastening systems and ballast materials are outlined. Methods for laboratory testing of ties and fastenings, and field performance of concrete tie track in the United States are discussed. Finally, advantages of concrete ties are summarized. The growing interest in North America in the use of concrete ties is justified by the greater consistency in product quality, suitability of concrete ties for use with continuously welded rails, expected long service life, and reduced maintenance requirements. With more than 100 million pretensioned concrete ties already in service, experience shows that the precast prestressed tie is functional, performs well structurally, and is durable and economical.

Hanna, AN

Portland Cement Association Reprint RD063.01R, 1979, 16p, 28 Fig., 2 Tab., 26 Ref.

ORDER FROM: Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois, 60077

01 324880

#### TRACK MAINTENANCE: MANAGEMENT AND PLANNING

In 1978, excess of 3.4 billion dollars was spent for maintenance and improvements of the fixed plants of American railroads. The lack of an accepted model of track deterioration makes an analytical approach to the planning and control of routine track maintenance difficult. Researchers are presently attempting to formulate a track deterioration model which could be utilized to analytically predict track maintenance requirements. Railroads cannot afford, however, to wait for the development of such a model to implement improvements to the planning and performance of track maintenance, particularly in the area of routine maintenance. Conrail has developed a Track Maintenance Management System (TMMS), which can be used for the control of routine track maintenance, and has a limited maintenance planning capability. Upon the development of a workable model of track deterioration, it can be integrated into the TMMS to create a Track Maintenance Planning System (TMPS).

Fazio, AE (Consolidated Rail Corporation) *ASCE Journal of Transportation Engineering* Vol. 106 No. 6, Nov. 1980, pp 705-720, 10 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

01 324939

#### EXPERIMENTAL AND THEORETICAL DETERMINATION OF THE DEVELOPMENT OF LONGITUDINAL FORCES AND DEFORMATION IN SWITCH POINTS [Experimentelle und theoretische Ermittlung des Laengkraft und Verformungsverlaufes im Weichenbereich]

A necessary requirement to express the stability of welded switchpoints in continuous track as a numerical value is an exact knowledge of the longitudinal force exerted in the external rails and the longitudinal movement of the rails and sleepers fastened to them. In the report presented, comments are given on the measurement of these two values on a track in operation, and a theoretical study based on this data. [German]

Stieber, J *Mitteilungen des Pruefantes Bau Landverkehrswegen* No. 32, DB: Dok 5202, 1980, 76p, 39 Phot., 20 Ref., 31 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Technical University of Munich, West Germany, Arcisstrasse 21, D-8000 Munich, West Germany

01 325278

#### CN "DOUBLE-TRACKS OUT WEST"

Canadian National has undertaken a complete rebuilding of the 764-mile Edmonton-Vancouver line in preparation for handling 75 MGT annually by 1990, much of this in unit trains of high-capacity cars. With \$450 million already expended and \$1.9 billion budgeted for the 1980 decade, the project calls for concrete cross ties, alloy-steel rail, and double track over much of the route. The P-811 Track Laying System is regarded as essential in assuring the productivity and controlling costs.

*Progressive Railroading* Vol. 23 No. 12, Dec. 1980, p 48, 11 Phot.

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

DOTL JC

01 325280

**CN RAIL PART 2: ON-THE-SPOT REPORT FROM WESTERN CANADA**

In this continuing series, CN Rail engineering officers on location describe specific details of the railroad's track program in its western Mountain Region. Reacting to effects on track of a major traffic growth during the 1970s, CN has installed heavy welded rail on its line between Jasper, Alta, and Vancouver along with concrete ties on 170 of the 550 miles of this route which ultimately will handle 70 MGT annually. The P-811 Track Laying System is used for the track rebuilding program. The track structure, curve superelevation and rail fasteners are discussed.

*Railway Track and Structures* Vol. 76 No. 12, Dec. 1980, p 20, 7 Phot.

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01 325281

**CN RAIL PART 2 CONT.: EXAMINING THE CONCRETE TIE OPTION**

Many factors must be considered in the choice of a concrete tie. A supplier to CN Rail gives his view of Canadian National's use of these ties and the meaning it may have for other railroads considering their use. CN does not look on the concrete tie as just a replacement for wood, but as part of a whole new concept to produce a track structure for coming decades. Economic justification for concrete ties must be made on a case-by-case basis.

*Railway Track and Structures* Vol. 76 No. 12, Dec. 1980, p 26, 7 Phot.

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01 325282

**1981-1985:--PROFILES OF REAL GROWTH IN M/W SPENDING**

In a survey of railroad spending plans for five years ahead, constant dollar increases are expected for both track material and maintenance equipment. While there is general optimism for continuing rehabilitation and upgrading of the railroads' physical plant, the effects of heavy axle loads and cash flow problems in some cases may make difficult a real increase in M/W spending.

*Railway Track and Structures* Vol. 76 No. 12, Dec. 1980, pp 34-36, 11 Fig.

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01 325426

**STRESSES IN RAILROAD TRACK--THE TALBOT REPORTS**

The reports of the AREA-ASCE Special Committee on Stresses in Railroad Track, under the chairmanship of Professor A. N. Talbot, represent one of the most comprehensive series of investigations into the behavior of railroad track structures ever undertaken. This effort, encompassing an examination of fundamental principles, comprehensive laboratory testing and extensive field testing, was covered in a series of seven progress reports issued between 1918 and 1940. The 25-year effort sought to characterize the response of track to vehicle loadings, aiming to verify theoretical analyses previously made. Laboratory and field testing involved development of new instrumentation and repeated conduct of characterization tests under differing conditions. The result was formulation of principles of track behavior that are still in use today. Among the many topics addressed were: elastic behavior of the track structure and formulation of representative track modulus values for American track; investigation of transmission of load from rails through ties and ballast to subgrade; dynamic vertical and lateral loading of track; effects of flat wheels and low joints; and benefits of canted tie plates. The fundamental concepts of track deformation and load transmission are still in use. No other series of investigations has had such an impact on American railway engineering.

American Railway Engineering Association 1980, 1304p, Figs., Tabs.

ORDER FROM: AREA

01 325429

**BETTER NUMBERS=MORE MONEY**

A new user-oriented computer set-up, Chessie System's Engineering Information System (EIS), is being used to control track maintenance costs. Computer-aided analysis is being used for scheduling and estimating track and roadway projects. Productivity of maintenance equipment and stability of maintenance force levels are among the goals sought for this management information system.

Mitchell, FS *Modern Railroads/Rail Transport* Vol. 35 No. 11, Nov. 1980, pp 79-80

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01 325708

**FATIGUE TESTS OF BOLTED CONNECTIONS DESIGNED BY SHEAR FRICTION**

The elevated structure of the Metropolitan Atlanta Rapid Transit Authority involves bolted connections designed to provide composite action between precast concrete deck slab units and the main longitudinal girders. The connection employs pretorqued, high-strength bolts not only to simplify assembly but also to produce a clamping force to maintain compression in the grout layer between girder and deck slab and to eliminate stress changes and minimize fatigue effects. This publication describes 16 test specimens that simulated the joint, producing data concerning the integrity of such connections under repeated loads from 2 to 5 million cycles.

Rabbat, BG Hanson, NW

Portland Cement Association RD064.01E, 1979, 6p, 7 Fig., 3 Tab., 3 Ref.

ORDER FROM: Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois, 60077

01 325716

**DEVELOPMENT OF A PROTOTYPE EMAT SYSTEM FOR INSPECTION OF RAILS**

This is the Final Report of the First Phase of an investigation of the application of Electromagnetic Acoustic Transducers (EMAT's) to detect flaws in railroad rails. EMAT's generate ultrasonic beams in rails and receive return signals without surface contact and without liquid couplant. This work used samples of flawed rails and laboratory EMAT equipment to verify that EMAT technology can detect critical rail flaws. Sperry Rail Service assisted in defining operating requirements for an operational inspection system. A preliminary determination of EMAT operating parameters for optimum flaw detection was made. This work demonstrated that virtually all of the critical rail flaws can be detected in the laboratory by EMAT's with a sensitivity comparable to that obtained with conventional piezoelectric transducers.

Alers, G McLaughlan, D Maseri, H Lee, R

Rockwell International, Federal Railroad Administration Final Rpt. FRA/ORD-80/45, Sept. 1980, 77p, 46 Fig., 5 Tab., 2 Ref., 1 App.

Contract DOT-FR-9143

ORDER FROM: NTIS

PB81-109514, DOTL NTIS, DOTL RP

01 325717

**A PROTOTYPE MAINTENANCE-OF-WAY PLANNING SYSTEM VOLUME I. FINAL REPORT (INCLUDING APPENDICES A THROUGH E)**

The results of this study substantiate the concept of using automatic track inspection vehicles as a tool in Maintenance-of-Way planning. This study is based on data collected over a period of one year on 288 miles of CONRAIL mainline track. Track geometry was measured using an FRA Track Geometry Measurement Vehicle. The concept of a figure of merit, based on track geometry (gage, profile, alignment, crosslevel and warp) and used as a means of quantifying track condition is developed. It is shown through correlation with Federal Track Safety Standards, standard Ride Quality Indices, and derailments that these figures of merit, referred to as Track Quality Indices (TQI's), are an objective measure of track condition. An initial set of 14 candidate TQI's is reduced to a set of five which best quantify the track's ability to meet its functional requirements. Next, eleven selected physical parameters, which affect the rate of track deterioration, are investigated. These are categorized as traffic, track structure and maintenance parameters. It is found that a subset of these is capable of accounting for at least 80 percent of the change in track condition as measured by a TQI. Predictive equations for each of the five TQI's are given for six levels and/or types of maintenance. These equations are significant above the 0.999 level. Illustrative degradation curves are derived from the predictive equations and specific observations are made for the test zone.

Hamid, A Sawyer, D Kenworthy, MA Rasmussen, K

ENSCO, Incorporated, Federal Railroad Administration Tech Rpt. FRA/ORD-80/47.I, DOT-FR-80-17, Nov. 1980, 117p, Figs., Tabs., 5 App.

Contract DOT-FR-64113  
ORDER FROM: NTIS

PB81-147159, DOTL NTIS, DOTL RP

01 325733

#### TRACK RENEWAL SYSTEM AND WOOD TIE REUSE ANALYSIS

This report presents the results of an analytical study of technical and economic feasibility of applying the track renewal method of railroad track maintenance in the United States. Track renewal, or out-of-face renewal, has long been the prevailing form of track maintenance used in Europe and has recently spread to Asia, Australia, and North America. Current North American activity is very limited, but the carriers and other elements of the railroad community are becoming increasingly interested in the potential advantages of track renewal as an alternative to selective maintenance. The core of the report consists of a detailed framework for conducting a comparative economic analysis of the track renewal method versus the traditional selective maintenance method. The framework includes detailed descriptions of both methods, unit costs for each major operation under each method, and the comparative present worth long-term costs associated with each method. The framework methodology is presented in detail so that the reader can examine and if necessary modify the built-in assumptions and thereby tailor the framework for application to a specific situation. A sample economic analysis is presented wherein the framework is used to compare the estimated long-term and first-year costs when they are applied to fourteen specific track maintenance scenarios, each of which represents a particular set of assumptions and conditions. The results of the sample analysis include the following: (1) track renewal offers the prospect of large long-term cost savings over selective maintenance, although only under certain circumstances; (2) wood tie reuse is a critical factor in optimizing the long-term savings; (3) with wood tie reuse, track renewal is likely to be \$15,000 to \$27,000 cheaper per track mile than selective maintenance over time; (4) the internal rate of return for track renewal is likely to be 25-35 percent; (5) the break-even point for first-year costs is about 32 percent tie replacement for installing wood ties and 75 percent for replacing wood with concrete ties; (6) ballast cleaning costs are reduced by about 28 percent with track renewal; and (7) track occupancy time for maintenance is reduced 60-79 percent with track renewal. The report also presents a worldwide survey of present and future track renewal machine technology to enable the reader to consider alternatives to the type of machine assumed in the framework and analysis. Also included is a discussion of the use of track renewal machines for abandoning existing track, building new track, and for other nonmaintenance applications. In addition, there is a brief section on two alternatives to track renewal machine ownership and operation by the railroads: (1) railroad leasing and operation, and (2) railroad purchase of services from contractor owner-operator. The report concludes with the identification of several areas for additional study, principally with respect to the further development and refinement of the framework as a research tool. It also states that the framework should be tested by one or more railroads; the results should be used to strengthen the framework and should also be shared with the railroad community.

Cataldi, GR Elkaim, DN  
Unified Industries, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-80/63, Oct. 1980, 98p, 29 Fig., 83 Tab.

Contract DOT-FR-9044

ORDER FROM: NTIS

PB81-125510, DOTL NTIS, DOTL RP

01 325876

#### STATIC AND DYNAMIC PROPERTIES OF RAILROAD BALLAST

The paper describes research undertaken to predict elastic and inelastic response of railroad track as related to the properties of the ballast materials. The elastic response involves the resilient modulus from repeated load triaxial tests. The inelastic response involves permanent strain accumulation under repeated load. A key problem in relating laboratory to field conditions was the difficulty in measuring the physical state of the ballast. A three-dimensional computer model of the track structure was used to determine the stresses in the ballast. A method was then proposed for converting these to the triaxial stress states in the laboratory. Apparatus used for performing these tests was described. Then examples of measured properties of ballast were given. The static test results were similar to those for other granular materials. The ballast was essentially elastic after a few

hundred cycles, but significant permanent strain continued to accumulate even after thousands of cycles. Measured values of permanent ballast strain in the field were compared to the laboratory results. Approximate agreement was found, but more study is needed to establish a permanent strain prediction approach with confidence. See also IRRD abstract no 250216.

Sexto Congreso Panamericano de Mecanica de Suelos e Ingenieria de Cimentaciones, Lima, Peru, 2-7 Diciembre 1979.

Alva-hurtado, J Selig, ET

Comision Organizadora del VI CPMSIF Vol. 2 Dec. 1979, pp 3-17, 12 Fig., 2 Tab., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 250221), Ministry of Public Works, Spain

ORDER FROM: Comision Organizadora del VI CPMSIF, Apartado Postal 11076, Lima, Peru

01 325890

#### LABORATORY INVESTIGATIONS OF THE STABILITY OF RAILROAD TRACK TIES ON REINFORCED BALLAST [Etudes en laboratoire de la stabilite de traverses ferroviaires placees sur un ballast arme]

The results have been presented of laboratory investigations of the stability of loaded track tie resting on sand ballast of great nonelastic deformability and reinforced with steel net. The investigations have been carried out at special investigation station at which Winkler type foundation was modeled. With reference to a track tie loaded at the same ballast without reinforcement much less tie settlements and more uniform distribution of the pressure at foundation were obtained. [French]

Colloq Int sur le Renf des Sols: Terre Armee et Autres Tech V 1, Paris, France, March 20-22, 1979.

Mazur, S

Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC 1979, pp 89-93, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC, 28 rue des Saints-Peres, 75007 Paris, France

01 325914

#### REPAIRING TRACKS LAID ON STEDEF TYPE SLABS DAMAGED DURING DERAILMENT [La remise en etat de voies sur dalles type STEDET avariees au cours d'un deraiement]

Three articles include: PRUD'HOMME, A.: Foreword; HOFMANN, C. and PFARRER, H.: Track renewal on the ballast-free test section in the Boettzberg tunnel on the Swiss Federal Railways, following a derailment; CERVI, G.: Repairing the Neuilly-sur-Marne slab track after a derailment. Different railways have used or tested ballast-free slab tracks, but it was feared that repairs after derailment would be longer and more difficult. After two derailments, however, it has been proved, as the authors show, that repair work can be carried out without too much difficulty. [French]

Revue Generale des Chemins de Fer Oct. 1980, pp 561-570, 17 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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01 325920

#### OBJECTIVE EVALUATION OF TRACK CONDITION AND INTEGRATION OF THIS METHODOLOGY IN THE SYSTEM OF PLANNING, CONTRACTING AND CARRYING OUT MAINTENANCE WORK [Objektive Bewertung des Oberbauzustandes und Einbindung dieser Methodik in das Planungs-, Vergabe- und Abwicklungssystem fuer Unterhaltungsarbeiten]

No Abstract. [German]

Naue, KH Fiebach, B Eisenbahningenieur Vol. 31 No. 9, Sept. 1980, pp 393-400, 5 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

01 326046

#### TRACK COMPONENT PROPERTY TESTS. VOLUME II-RAIL, TIES, JOINT-BARS AND FASTENERS

This report describes the test procedures and the results of the tests on the physical properties of rail, concrete ties, jointbars and fasteners. The



properties obtained are the torsional rigidity of rail, bending rigidity of concrete ties, bending stiffness of jointbars and fastener resistance to rotation about the vertical, lateral and longitudinal axis. The components tests were run on two rail sections, 115 RE and 136 RE, on five different concrete ties, on 136 RE rail joint bars, and on five fasteners configurations on the two different rails on wood ties and two configurations on the 115 RE rail on concrete ties.

See also Volume 1, PB80-142367.

Choros, J Gitlin, I  
Association of American Railroads Technical Center, Federal Railroad  
Administration Intrm Rpt. FRA/ORD-80/25, June 1980, 55p

Contract DOT-FR-30038

ACKNOWLEDGMENT: NTIS

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PB80-218977, DOTL NTIS

01 326057

#### LABORATORY INVESTIGATION OF LATERAL TRACK SHIFT

This report describes test procedures and results of the AAR lateral track shift tests. The tests included static and dynamic lateral track loadings under various vertical loads, relative effects of single and double axle loading, panel shift tests and single tie tests. These tests, which were conducted at the AAR's Track Laboratory, were designed to quantify and determine the lateral strength of the track using various methods. The test results are limited to an unconsolidated track condition. The results indicate that a lateral stiffness of the track can be determined from each of the three methods used. These results, obtained from each of the methods tested, are compared in this report.

Choros, J Zarembski, AM Gitlin, I  
Association of American Railroads Technical Center, Federal Railroad  
Administration Intrm Rpt. FRA/ORD-80/27, Aug. 1980, 83p

Contract DOT-FR-30038

ACKNOWLEDGMENT: NTIS

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PB80-223928, DOTL NTIS

01 329944

#### PROBLEMS IN SHINKANSEN RAILS AND COUNTERMEASURES

This paper summarizes a series of technical presentations at the Railway Technical Research Institute. Discussions center on damage to rails of the Shinkansen high-speed line. Defects in welds and in other parts of the rail are described and countermeasures are proposed. Data includes the status of track maintenance and significance of rail problems; welded rail failures; rail-head failures; shelling; fatigue crack propagation; and improved welding techniques.

*Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 115-122, 14 Fig., 4 Tab.

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02 053380

**STATISTICAL EVALUATION OF DERAILMENT TESTS IN DERBY (SEPTEMBER, 1977) WITH TWO-AXLED GOODS WAGONS**

The measuring results of the derailment tests by BR described in ORE Report C 138/RP 3 are evaluated using the methods of the analytical/mathematical statistics. Regarding the magnitude deduced  $(Y/Q)_a$ , a relationship with the lifting of the outer wheel in the curve  $dz$  sub  $a$  and the numerical determination of a limiting value  $\text{Lim } (Y/Q)_a$  is developed.

Restrictions on the use of this document are contained in the explanatory material. This Technical Document was compiled within the scope of activities of the ORE Specialists Committee for Question C 138.

International Union of Railways DT 97 (C138)E, Feb. 1979, 34p, 34 Fig.

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02 053381

**PERMISSIBLE LIMIT VALUES FOR THE Y AND Q FORCES AND DERAILMENT CRITERIA. EFFECT OF THE SPACING OF CONSECUTIVE AXLES ON THE MAXIMUM PERMISSIBLE VALUE OF LATERAL LOAD FROM THE POINT OF VIEW OF TRACK DISPLACEMENT. SECOND PART. TESTS ON BOGIE WAGONS**

The present report describes the results obtained with the two bogie vehicles successively: a summary of the programme of tests and results obtained with the two-axled wagon; a description of the test installation; the characteristics of the bogie vehicles; the conditions for the execution of the tests and the results obtained; and a comparative analysis of the results contained for the 3 types of vehicle. These results show in particular that for closely spaced axles the value  $S$  sub  $\text{lim}$  related to the axle exposed to the highest lateral load in absolute numbers, varies with the ratio between the loads applied to 2 consecutive wheelsets, the minimum being reached when these 2 loads are equal. This minimum does not significantly differ from the value  $S$  sub  $\text{lim}$  determined for the case of the single wheelset, for which it is close to  $(10 p \text{ over } 3) \text{ kN}$  ( $P = \text{axle-load}$ ) for the track conditions retained for the tests.

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

International Union of Railways C 138/RP 4, Apr. 1980, 36p, 68 Fig.

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02 053385

**RAIL FORCE STRESSES DUE TO Y AND Q FORCES COMPUTATION METHODS**

Two methods are described to determine the maximum acceptable principal stresses in a rail outside the Hertzian contact area, these methods being simpler than the finite element method. In most cases the theory of a continuously supported bending beam with infinite length is used for this type of loading. The problem is that torsion can be transmitted in two different ways as lateral forces in the head and foot of the rail, and as free-buckling torsion. This phenomenon is studied with two models: in the first, rail support is assumed to have continuous elasticity, the second, is based on a support with discrete elasticity. In addition, the problem of the boundary conditions is analysed.

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

Dubbeldam, JW

International Union of Railways DT 104 (C 138)E, Jan. 1980, 26p, 5 Fig., 3 Tab.

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02 314428

**DYNAMIC HOPPER CAR TEST**

This report describes a test designed to establish the relationship between ride performance and track degradation, vehicle component wear, and the combined effect of rail degradation and component wear. The test was also designed to quantify the dynamic response of freight vehicles to different track structures. Two 100-ton hopper cars, one a high-mileage car and the other a low-mileage car, were instrumented and used to measure lateral and vertical wheel/rail forces, and truck and carbody modal accelerations. The results of the test will be used to quantify the dynamic response of freight

vehicles to different track structures and to establish a baseline for future study of ride performance, and track and vehicle degradation.

Prepared for FAST (Facility for Accelerated Service Testing) Program.

Kenworthy, MA Jones, CT

ENSCO, Incorporated, Federal Railroad Administration Intrm Rpt. ENSCO/DOT-FR-77-21, FRA/TTC-80/01, Mar. 1980, 75p

Contract DOT-FR-64113

ACKNOWLEDGMENT: NTIS

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PB80-187925, DOTL NTIS

02 314443

**MEASUREMENTS OF NONLINEAR WHEELSET FORCES IN FLANGE CONTACT USING DYNAMICALLY SCALED MODELS**

This report presents new experimental methods for the study of rail vehicle dynamics through the use of scaled models on tangent track, and the application of these techniques to the measurement of nonlinear wheelset force/displacement relations in steady-state. These relations are important to the analysis of wheelset response to track inputs, curving performance of trucks, and wheelclimb derailment. A one-fifth scale model instrumented wheelset with new wheel profiles is used, with similitude scaling of the contact forces achieved through use of a polycarbonate resin for the contact surfaces. Data are presented for wheelset lateral force and yaw moment for the nonlinear range of wheelset lateral displacements and yaw angles, including flange contact. The measured data validate the analytical model presented in a companion report, based on nonlinear wheel/rail contact geometry, creep forces with adhesion limits, and wheelset kinematics. A criterion for wheelclimb derailment is presented and verified experimentally.

Sweet, LM Sivak, JA Putman, WF

Princeton University, Department of Transportation Final Rpt. MA-E/TR-1406, DOT/RSPA/DPB-50-80/6, Mar. 1980, 112p

Contract DOT-OS-60147

ACKNOWLEDGMENT: NTIS

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PB80-190747

02 318310

**ALLEVIATION OF PRESSURE PULSE EFFECTS FOR TRAINS ENTERING TUNNELS. VOLUME 1: SUMMARY**

The degree to which it is possible to attenuate the effects of pressure pulses on the passengers in trains entering tunnels by modifying the normally abrupt portal of a constant-diameter single track tunnel was investigated. Although the suggested modifications to the tunnel entrance portal may not appreciably decrease the magnitude of the pressure rise, they are very effective in reducing the discomfort to the human ear by substantially decreasing the rate of pressure rise to that which the normal ear can accommodate. Qualitative comparison was made of this portal modification approach with other approaches: decreasing the train speed or sealing the cars. The optimum approach, which is dependent upon the conditions and requirements of each particular rail system, is likely to be the portal modification one for a rapid rail mass transit system.

Sponsored in Part by DOT. Presented at the 3RD Intern. Symp. On the Aerodyn. And Ventilation of Vehicle Tunnels, Sheffield, England, 12-21 Mar. 1979; Sponsored by Bhra Fluid Engineering.

Dayman, BJ Hammitt, AG Holway, HP Tucker, CE, Jr Vardy, AE

Jet Propulsion Laboratory, National Aeronautics and Space Administration Final Rpt. NASA-CR-163012, JPL-PUB-78-73-V-1, June 1979, 51p

Contract NAS7-100

ACKNOWLEDGMENT: NTIS

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N80-25208/3

02 318518

**INCREASED RAIL TRANSIT VEHICLE CRASHWORTHINESS IN HEAD-ON COLLISIONS. VOLUME IV. TRAIN USER'S MANUAL**

A specific goal of safety is to reduce the number of injuries that may result from the collision of two trains. In Volume IV, a computer code for the simulated crash of two railcar consists is described. The code is capable of simulating the mechanics of head-on impact of two consists on straight level track. The simulation is limited to two dimensions, namely a vertical plane

containing the length of the track. The user can model the individual car components or cars in a complex or as simple a manner as is warranted by the simulation results desired. Although specifically developed for transit cars, the code can also be used to simulate freight trains or intercity passenger trains.

See also Volume 1, PB80-205727:

Hahn, EE

IIT Research Institute, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0025) Final Rpt. UMTA-MA-06-0025-804, June 1980, 233p

Contract DOT-TSC-1052-4

ACKNOWLEDGMENT: NTIS

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PB80-205735

## 02 318957

### MEASUREMENT OF WHEEL/RAIL FORCES AT THE WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY. VOLUME I. ANALYSIS REPORT

Under the direction of the Urban Mass Transportation Administration (UMTA), measurements of wheel/rail forces were made in August 1979 by the Transportation Systems Center (TSC) with the assistance of Battelle Columbus Laboratories to determine the causes of excessive wheel/rail wear experiences by the Washington Metropolitan Area Transit Authority (WMATA) Metrorail System during its first three years of operation. In addition to measuring the absolute magnitude of the wheel/rail forces, it was the intent to compare alternative methods for relieving wheel/rail wear at WMATA and other transit properties. Measurements of the wheel/rail forces were made at the Washington National Airport Test Site and the Brentwood Shop Test Site. This report describes the results of that effort.

Phillips, C Weinstock, H Greif, R Thompson, WI, III  
Transportation Systems Center, Urban Mass Transportation Administration DOT-TSC-UMTA-80-25-1, UMTA-MA-06-0025-80-6, July 1980, 48p

Contract DOT-MA-06-0025

ACKNOWLEDGMENT: NTIS

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PB80-212772

## 02 319311

### PROFILE: GRADIENT SIMULATION FOR RAIL HUMP CLASSIFICATION YARDS

Designers of rail hump yards traditionally execute a long, tedious manual process to optimally design hump grades and retarder placements. This design process entails checking the velocities and headways of a worstcase sequence of cars to ensure that proper values of these variables can be maintained on the gradient. The computer simulation model PROFILE automatically computes these quantities and thus frees the designer from tedious work and allows him or her to generate and study more design alternatives. The model uses the usual static (velocity-independent) rolling-resistance formulation of car rollability but includes the option of using velocity-dependent rolling resistance. User input requirements and program-generated output are described, and an example of the application of the model to a typical design problem is given.

This paper appeared in Transportation Research Record No. 744, Railroad Track and Facilities.

Stock, WA Sakasita, M Elliott, CV Wong, PJ *Transportation Research Record* No. 744, 1980, pp 52-58, 4 Fig., 8 Ref.

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## 02 319959

### (THE INFLUENCE OF ELASTICITY AND OF COUPLING ON RAIL VEHICLE STABILITY WITH REGARD TO HUNTING MOVEMENT AND NEGOTIATING CURVES [Der Einfluss von Elastizitaeten und Kopplungen auf Schlingerstabilitaet und Bogenlauf von Schienenfahrzeugen])

The critical speed on straight track is evaluated from the linear theory of the hunting movement, taking account of the effect of various parameters. Theoretical evaluations are established to improve stability as regards hunting, and compared with the results of tests made on vehicles. Running

on curves is studied with rigidly guided axles, radially controlled axles, and self-adjusting axles, and this study is confirmed by tests. The article deals particularly with cross-braced bogies, and with wheel profiles. [German]

Scheffel, H *Leichtbau der Verkehrsfahrzeuge* Vol. 23 No. 6, Nov. 1979, pp 133-145, 26 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

## 02 319992

### RESISTANCES OF THE AIR IN THE RUNNING OF TRAINS IN TUNNELS

The study of the additional resistance to the movement of trains in tunnels goes back to the end of the last century when investigations had been started on the ventilation rendered necessary on account of the pollution caused by the combustion of carbon in steam traction. Subsequently there have been other investigations and experimental researches which, however, have been discontinued with the diffusion of electric traction. In the technical literature in the last few years memoranda and articles have reappeared in which information is given on new theoretical and experimental findings on the resistance offered by the air to the progress of traction units rolling stock of modern form and shape whether in open track or in tunnel in relation also to high speeds. In the present treatment which comes within the scope of these findings, not being able to appeal to actual experiments however it is proposed with the help of traditional calculation systems, to bring the problem forward again, endeavouring to demonstrate the interdependence of some geometrical and physical parameters characterizing a tunnel and a railway train with the additional resistances to progress in underground structures. The phenomenon is quantified in a sufficiently large number of cases from which to draw conclusions of a general nature useful either for the operating or for the planning of high speed lines.

Pellis, P *Rail International* Vol. 11 No. 4, Apr. 1980, pp 252-261

ACKNOWLEDGMENT: British Railways

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## 02 319993

### BOGIE CARS, CURVE MEMORY AND TARGET SHOOT

Swiss Federal Railways have established that bogie cars, after having negotiated a curve, feature a resistance running on the following straight section which is initially higher than the corresponding rolling resistance. This phenomenon is designated as curve memory. Its magnitude has been determined by measurements. For target shooting, the rolling resistance of the individual vehicles is measured precisely within this range so that the phenomenon of curve memory has an adverse effect on the control of the shunting procedure. [German]

Koenig, H Pfander, JP *Glaser Annalen ZEV* Vol. 104 No. 5, May 1980, pp 138-140

ACKNOWLEDGMENT: British Railways

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## 02 319994

### STOCHASTIC PHENOMENA AND TRANSMISSION CHARACTERISTICS OF RAIL VEHICLES

A rail vehicle is selected as an example of a dynamic system, because it constitutes a complicated system with several correlated or non-correlated input excitations. The methods described for solution are, however, generally applicable to all dynamic systems. [German]

Rus, L *Glaser Annalen ZEV* Vol. 104 No. 6, June 1980, pp 159-162

ACKNOWLEDGMENT: British Railways

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## 02 322033

### NUMERICAL METHODS OF DETERMINING DRY FRICTION FORCES IN THE SHOCK ABSORBERS OF A TRAIN [Metody numeryczne wyznaczania sil tarcia suchego w amortyzatorach pociagu]

On the basis of a model in which the train is represented by a system of N masses connected by shock absorbers, the problem of determining the dry friction forces for zero slip velocities is considered, and the convergence of



the numerical methods proposed for the solution of this problem is proven. The calculated solutions appear to be a very good approximation of the values measured in the experimental train. [Polish]

Grzesikiewicz, W. Wakulicz, A. *Politechnika Warszawska, Prace Naukowe, Mechanika* No. 63, 1979, pp 5-44

ACKNOWLEDGMENT: EI  
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02 322536

## DECISIONS PUSHING THEORY?

While dynamic deficiencies of the conventional three-piece (Type I) freight-car truck continue to be realized and countered, railroads have been reluctant to buy more refined (and expensive) types. The claimed advantages of the so-called Type II truck are not always easy to demonstrate or to analyze on a financial basis. The article describes advanced trucks, radial and non-radial, and discusses running gear being appraised for Amtrak passenger cars and for rapid transit equipment. The Transportation Test Center's role and capabilities in the appraisal of railroad running gear and vehicle dynamics are also described.

Armstrong, JH *Railway Age* Vol. 181 No. 17, Sept. 1980, p 30, 9 Phot.

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02 322559

## 100 METRES PER SECOND ON RAILS

In the Emsland region, a test stretch is being developed from Rhein via Spelle to Freren, for the purpose of research and further development of the wheel/rail system. In this article the organizational preconditions, the problems arising, the functions of the test line, and the resulting planning, as well as the present-day situation, are described. Further explanations refer to the rolling-test stand at Munchen-Freimann, to the permanent way test line Dachau-Munchen-Karlsfeld, and to the test vehicle. [German]

Riechers, G *Eisenbahningenieur* Vol. 31 No. 7, July 1980, pp 301-309

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

02 322811

## DYNAMIC INTERACTION OF RAILWAY TRAIN AND BRIDGES

An analytical method for obtaining the dynamic response of a train moving on a bridge is presented. The ratio of dynamic response to maximum static response is called the amplification factor, and its maximum absolute value minus one is called the impact. Each four-axle locomotive is modelled as a rigid body with three degrees of freedom: bounce, pitch, and roll, and with a suspension system consisting of springs mounted on wheels. The carriages are assumed to be connected by frictionless joints to form the train. The bridge is modelled as a three dimensional structure, with the masses lumped at the truss joints. All joints, including the floor beam connections, are assumed to be rigid, except those for the bracing members, which are assumed to be hinged. Vertical displacements are considered as the only dynamic degree of freedom. The mathematical formulation is described briefly, and a numerical example is given. Locomotive and truss member properties, together with stresses in some typical members, are given in the tables. The amplification factors of the responses in some typical bridge members are shown in the figures.

Chu, KH (Illinois Institute of Technology); Garg, VK (Association of American Railroads); Wiriychai, A (Illinois Institute of Technology) *Vehicle System Dynamics* Vol. 9 No. 4, July 1980, pp 207-236, 16 Fig., 8 Tab., 21 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 248841)  
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DOTL JC

02 322942

## AERODYNAMIC PHENOMENA DURING THE RUNNING OF FAST TRAINS IN TUNNELS [Fenomeni aerodinamici nella marcia veloce in galleria]

Description of tests carried out to study aerodynamic phenomena caused by the running of fast trains in tunnels; these tests related to three aspects: recording of aerodynamic phenomena occurring during the running of an ordinary train (444-type locomotive plus coaches); recording of aerodynamic

phenomena occurring during the running of a lightweight train (Ale/le 601 motor trainset); recording of aerodynamic phenomena occurring when these two trains pass in a tunnel. [Italian]

Bianchi, C *Tecnica Professionale* No. 2, Feb. 1980, pp 14-20, 1 Tab., 11 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Collegio Ingegneri Ferroviari Italiani, Via Giolitti 34, Rome, Italy

02 323189

## VOLUME III--SUSPENSION DYNAMICS: USE OF AUXILIARY SUSPENSION DEVICES

This report is the final volume of an extensive suspension dynamics parametric study, conducted during Track-Train Dynamics-Phase II. It supplements the two previous reports: R-224 and R-350, published by the Association of American Railroads Technical Center, Chicago, Illinois. The purpose of the study reported in this volume was to evaluate the effects of auxiliary suspension devices on the attenuation of freight car rock and roll motions. Two cars, a 100-ton covered hopper and a 100-ton open-top hopper, were studied in the investigation. The suspension devices studied included constant-contact side bearings; rubber pads, located between the carbody and truck bolsters; and two hydraulic units, A and B, located below the truck bolster in the suspension spring group.

Bullock, RL Singh, SP  
Association of American Railroads Technical Center AAR R-449, Sept. 1980, 44p, Figs., 2 App.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

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02 323204

## MEASURING WHEEL FOR MEASUREMENT OF TRANSVERSE FORCES EXCHANGED BETWEEN RAIL AND WHEEL

On Indian Railways transverse forces between the rail and the wheel are measured at axle box level by means of load cells. For direct measurement of transverse forces at rail level, "measuring wheel" technique has been recently developed. The development involves identification of locations on the wheel disc which are least sensitive to the vertical load variations. Identification of these locations has been carried out on a specially designed calibrating rig. The strain gauges are fixed at the identified locations to form wheatstone bridge. For the prevailing operating speeds on Indian Railways, six strain gauge locations each 60 deg apart have been found adequate for continuous measurement of transverse forces. Final calibration is carried out on the rig by studying the strain output pattern of the bridge formed for one complete revolution under the combined effect of both vertical and transverse loads of varying magnitudes. For transmission of signals produced by the rotating measuring wheel to the recording instruments in the Oscillograph Car, wireless has been found effective and reliable. System consists of a low frequency, frequency modulated oscillator, signal receiving coil hung from the under-frame and low frequency, frequency modulated discriminator and other recording instruments. Extensive field trials have been conducted with the measuring wheel fitted under a 4-wheel freight car and based on the results relationship between the flange force by measuring wheel and the transverse force at axle box level has been arrived at. This relationship is found independent of the track geometry and its parameters. Further work on the development of a measuring wheel for 18.8 t axle load wheel set used under diesel-electric locomotives is in progress; both vertical and lateral forces will be measured.

Tayal, HP *Rail International* No. 7-8, July 1980, pp 461-466, 11 Fig.

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02 323205

## AUSTRALIAN RESEARCH ON FUTURE RAILWAYS

As the weights of heavy-haul railway trains and their individual carloads move steadily upward, both track and rolling stock have shown an alarming tendency to destroy themselves. The Pilbara region of northwest Australia with its series of iron-ore-hauling railroads is emerging as a proving ground for possible solutions. The Melbourne laboratory of Broken Hill Properties, supported by two of the railway operators, is conducting a series of interrelated studies of the performance of track structures and vehicles, along with the nature of forces generated by heavy-haul train/track

dynamics. BHP laboratories is looking for new steels for rails, alloys that are durable but not too expensive; for improvement in tracking of cars, particularly on curves; and for optimum track maintenance standards. Research on train handling is being conducted by the University of Western Australia. All this research is of growing importance as Australia looks also to further expansion of its mileage of heavy-haul railways.

*Rail International* No. 7-8, July 1980, pp 467-470, 3 Phot.

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02 323219

#### LABORATORY SIMULATION OF WHEEL AND RAIL CONTACT RELATED PARAMETERS

This paper presents techniques and limitations of simulation of wheel and rail in laboratory conditions. Adhesion, creep, contact stress, plastic flow, wear and surface roughness can be simulated in the laboratory. Constant adhesion machines are recommended for good simulation. Size effects are shown to be important for machine design. A contact track angle is defined as an important parameter for determining the degree of validation of a laboratory test. Two types of laboratory simulations, called Hertzian simulation and Geometrical simulation are comparatively discussed along with the IIT-GMEMD Wheel Rail Simulation Facility. Contact stresses and dimensions have been calculated for various U.S. freight cars and locomotives. Simulations of these parameters has been achieved for both Hertzian and Geometrical simulations. Results of calculations for field and laboratory parameters are tabulated and also given in nomographic form. It is shown that good simulation of wheel and rail in laboratory is quite feasible within certain test limitations.

Kumar, S Rajkumar, BR (Illinois Institute of Technology) *AREA Bulletin* Vol. 82 No. 679, Sept. 1980, pp 1-20, 8 Fig., 4 Tab., 14 Ref.

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02 323230

#### TEMPERATURE RISE DUE TO SLIP BETWEEN WHEEL AND RAIL: AN ANALYTICAL SOLUTION FOR HERTZIAN CONTACT

The temperature rise due to slip between wheel and rail is, obtained by the Laplace transform method. The pressure distribution at the wheel-rail contact is taken to be elliptical and it is assumed that the fast moving heat source can be approximated to an instantaneous static source.

Tanvir, MA *Wear* Vol. 61 No. 2, June 1980, pp 295-308

ACKNOWLEDGMENT: British Railways

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02 324402

#### INFLUENCE OF VEHICLE/TRACK INTERFACE CHARACTERISTICS ON VEHICLE DYNAMICS--SNCF EXPERIENCE

The author reports on a separate study of vertical and lateral dynamics behavior, the latter revealing dependence on the wheel/rail contact-point and relative speed of slide, and shows how by establishing a critical speed above service speed, the bogie lateral oscillations were avoided on French National Railroads.

Moreau, A (French National Railways) *Rail Engineering International* Vol. 9 No. 1, Jan. 1980, pp 23-27

ACKNOWLEDGMENT: EI

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02 324408

#### ISO STANDARDS OF VIBRATIONS

The paper deals with the characteristics of vibration exposure. Guide to vibration evaluation is presented and assessment of frequency spectrum is made. Vibrations in more than one direction at the same time and duration of vibrations are discussed.

Uetake, Y (Japanese National Railways) *Permanent Way* Vol. 22 No. 1, Mar. 1980, pp 23-29

ACKNOWLEDGMENT: EI

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02 324428

#### CHARACTERISTICS OF BIAxIAL VEHICLES IN CURVES

[Beitrag zum Verhalten eines Zweiachsigen Fahrzeuges im Gleisbogen]

The study described deals with the problem of unequal friction of front and rear wheel sets acting on the rails, which is a result of the difference in the geometric angles of attack. The conditions are explained under which three possible kinds of free-wheeling may occur. The behavior characteristics of biaxial vehicles are illustrated with the aid of examples. [German]

Zemla, A *Glaser's Annalen ZEV* Vol. 104 No. 5, May 1980, pp 141-145, 6 Ref.

ACKNOWLEDGMENT: EI

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02 324430

#### PARAMETRIC STUDY OF A LARGE CAPACITY RAILROAD FREIGHT VEHICLE SUSPENSION

A mathematical model of a railroad freight vehicle is presented. The model is constructed in such a way to describe the rock sway and bounce modes of the system and also to account for most of the nonlinearity effects experienced by the system. Time and frequency responses evaluated from the model are compared with the available measured data to establish the validity of the mathematical model.

Large Eng Systems 2, Proceedings of the International Symposium on Large Eng Systems, 2nd, University of Waterloo, Ontario, May 15-16, 1978.

Sankar, TS (Concordia University, Canada); Samaha, M  
Sandford Education Press 1978, pp 81-86, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Sandford Education Press, Waterloo, Ontario, Canada

02 324440

#### AN INVESTIGATION OF IMPACT LOADS DUE TO WHEEL FLATS AND RAIL JOINTS

Vertical impact loads between wheel and rail result from running surface anomalies such as flat spots on a wheel or a dipped rail joint. Recent measurements of loads under high-speed freight traffic have resulted in both a qualitative evaluation and a statistical definition of impact loads. These data have been utilized to develop mathematical models of wheel/rail impact behavior, to define shock loads on truck components as well as loads and stresses in the rail and track structure.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November, 16-21, 1980.

Ahlbeck, DR (Battelle Columbus Laboratories)

American Society of Mechanical Engineers Conf Paper 80-WA/RT-1, 1980, 10p, 13 Fig., 2 Tab., 15 Ref., 1 App.

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02 324444

#### THE DEVELOPMENT OF AN OPTIMUM WHEEL PROFILE FOR SELF-STEERING TRUCKS UNDER HEAVY AXLE LOAD CONDITIONS

The development of the self-steering truck utilizing profiled wheel treads has resulted in a drastic reduction in both wheel flange and tread wear. As a result, a variety of wheel tread profiles with significantly different characteristics may be designed which will retain their contours over extended periods of service. The development of the modified drooping conicity profile is described which is considered to optimize wheel/rail contact conditions for decreased wear and increased fatigue life.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Scheffel, H Tournay, HM (South African Railways)

American Society of Mechanical Engineers Conf Paper 80-WA/RT-5, 1980, 12p, 21 Fig., 8 Ref., 4 App.

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02 324447

**LABORATORY INVESTIGATION OF WHEEL RAIL CONTACT STRESSES FOR U.S. FREIGHT CARS**

Importance of the wheel rail contact stresses in track degradation and safety of trains is discussed. Theroetical elastic contact stresses based on Hertz theory for various U.S. railroad cars are presented. These contact stresses were produced for simulation of different cars on the IIT-GM-EMD wheel rail simulation facility which is briefly discussed. Experimental measurements of contact areas at the facility for 55, 70, 95 and 125 ton cars, including changes due to the plasticity and wear effects are given. Based on these, the average contact stress variation with time is shown. It is observed that the contact stresses for cars stabilize at a nearly constant value within a range of 88-103 ksi. Due to increased plasticity effects under cyclic loading the stabilized contact stress levels for heavier cars are found to be at lower stress levels as compared to lighter cars. Stabilized contact stresses are compared with theroetical values predicted by Melan and Johnson under simplified load and material behavior conditions. Experimental values are somewhat higher as expected. Laboratory data on contact stresses is compared with contact stresses measured at the Facility for Accelerated Service Testing for 10 ton cars. Good corroboration with laboratory data was observed. A summary comparison of current industry design contact stresses with laboratory and field measurements shows that the contact stresses are too high and not stable for U.S. freight cars using the current AAR standard wheel rail designs. A concept of profile stability is proposed for future profile designs which are much needed for the heavy tonnage cars.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Kumar, S Rajkumar, BR (Illinois Institute of Technology)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-8,  
1980, 10p, 12 Fig., 1 Tab., 21 Ref., 2 App.

ORDER FROM: ESL

DOTL RP

02 324449

**CONSIDERATIONS ON THE USE OF RADIALLY-STEERED WHEELSETS IN RAILWAY TRUCKS**

This paper presents the wheel-rail relationship in a simple form for the understanding of the action of a radially steerable wheelset located in a truck. The magnitude of the adhesion values can be allowed for with regard to prevailing rail conditions while the tire profile can be conical, hollow or cylindrical. The small angle between the plane of the wheel and the tangential plane to the rail is of great importance, both on straight track and in curves, since it determines the magnitude of the longitudinal as well as lateral forces between wheel and rail which are, in turn, determined by the contact area and the prevailing adhesion values. Since all forces acting upon the truck must be in equilibrium, this determines the direction of the motion and the position of the truck in curves. A few trucks with carbody-steered wheelsets are dealt with to illustrate the relevant points.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Liechty, R  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-10,  
1980, 7p, 11 Fig., 7 Ref.

ORDER FROM: ESL

DOTL RP

02 324495

**HIGH SPEED PASSENGER LOCOMOTIVES AND TRACK STRUCTURES**

This report presents the results of a brief track structure/locomotive interaction study for VIA Rail Canada Inc. A state-of-the-art literature survey resulted in a parametric analysis describing the impact of locomotive speed, axle load, unsprung mass and track maintenance standards on the track. The impact of other track and locomotive parameters--timber versus concrete ties, wheel diameter, etc.--was also considered.

Fitzpatrick, C Lake, RW  
Canadian Institute of Guided Ground Transport, Via Rail Canada,  
Incorporated, (PRO-928) Final Rpt. CIGGT 79-17, Mar. 1980, 45p, 40  
Fig., 2 Tab., Refs., 1 App.

ORDER FROM: CIGGT

DOTL RP

02 324879

**GEOTRACK MODEL FOR RAILROAD TRACK PERFORMANCE**

In order to provide a basis for predicting track performance, an analytical model is necessary that will realistically represent the actual behavior of the track system subjected to vehicle loading conditions. The model should adequately characterize the three-dimensional nature of this problem; the various soil and ballast layers can be distinguished and be given proper material properties. In this paper a model is presented that incorporates both of these requirements with a feature which permits loss of contact between tie and ballast when the rail springs up. This model, named GEOTRACK, was developed primarily to characterize the geotechnical aspects of the track behavior. The predictions of this model are in good agreement with measured stresses, strains, and displacements from field experiments at the government test track in Pueblo, Colo.

Chang, CS (Massachusetts University, Amherst); Adegoke,  
CW Selig, ET *ASCE Journal of the Geotechnical Engineering Div* Vol.  
106 No. 11, Nov. 1980, p 1201, 26 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

02 324912

**INVESTIGATION OF MOTION STABILITY OF A RAILROAD VEHICLE USING THE NEUMARK METHOD [Die Untersuchung der Stabilität der Bewegung eines Eisenbahnfahrzeuges mit Hilfe der Neumarkschen Methode]**

The Neumark method may help in determining the stability limit curves in a plane in which some parameter of the system represents the abscissa and another one the ordinate. Hitherto the method was used for the case that the coefficients of the characteristic equation are linear functions of both of the parameters. By applying it on the case of a single railway vehicle, moving along the track, it is shown that the method is not restricted to such linearities. [German]

Pater, AD de (Delft University of Technology, Netherlands) *Ingenieur-Archiv* Vol. 49 No. 3-4, 1980, pp 195-200, 3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

02 324913

**DYNAMIC RESPONSE OF A SIX-AXLE LOCOMOTIVE TO RANDOM TRACK INPUTS**

Spectral analysis techniques are employed to analyze the dynamic response of a six-axle locomotive on tangent track to vertical and lateral random track irregularities. The locomotive is represented by a thirty-nine (39) degrees of freedom model. A linear model is employed by considering small displacements, linear suspension elements and a linear theory for the wheel-rail interaction. Power spectral densities of displacements, velocities and accelerations and the statistical average frequencies of the system are obtained for each degree of freedom. Comparison of the calculated dominating frequencies with existing experimental values shows good agreement. The technique of spectral analysis is an effective tool for model validation, and for the deformation of rail vehicle response to track irregularities. The probability functions for the response can be used as a measure for the ride quality of rail vehicles and for the study of fatigue damage of components.

Garivaltis, DS (Association of American Railroads); Garg,  
VK D'Souza, AF *Vehicle System Dynamics* Vol. 9 No. 3, May 1980, pp  
117-147, 18 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

02 324932

**BOGIE WAGONS, CURVED TRACK RESIDUAL ROLLING RESISTANCE AND FLY SHUNTING [Drehgestellwagen, residualer Bogenwiderstand und Laufzielbremsung]**

The Swiss Federal Railways have discovered that bogie wagons have a higher running resistance on straight stretches immediately following curves than the normal running resistance. The extra resistance is called curved track residual running resistance. The measuring process to explain this phenomenon and interpretation of the results are described in the article. The residual running resistance is then established over a distance of 15 to



25 m following the curve. The implications of the discovery on fly shunting in marshalling yards are discussed. [German]

Koenig, H Pfander, JP *Glaser Annalen ZEV* Vol. 104 No. 5, 1980, pp 138-140, 5 Phot., 2 Ref.

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

DOTL JC

02 325427

#### FATIGUE DAMAGE OF THE LOCOMOTIVE SUSPENSION ELEMENTS UNDER RANDOM LOADING

Spectral analysis techniques are employed to analyze the fatigue damage to the suspension of a six axle locomotive on tangent track with vertical and lateral random track irregularities. The locomotive is represented by a thirty-nine (39) degrees of freedom linear model. Spectral densities of forces and probability density functions for stress levels in suspension elements are generated. Using a modified definition of transmissibility, the probability density functions of the output/input and mean square values of outputs are obtained for various stiffness ratios. A cumulative linear damage criterion based on Miner's theory is employed to predict fractional damage per operational second and mean life of the suspension elements. Operational stress cycles/sec. versus operational stress level are plotted for the suspension elements. These operational characteristics in conjunction with fatigue characteristics (S-N curve) can be effectively used as a tool for fatigue design.

Contributed by the Design Engineering Division for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980 of the American Society of Mechanical Engineers.

Garivaltis, DS Garg, VK (Association of American Railroads);  
D'Souza, AF (Illinois Institute of Technology)  
American Society of Mechanical Engineers Conf Paper 80-WA/DE-7,  
June 1980, 10p, 20 Fig., 14 Ref., 1 App.

ORDER FROM: ESL

DOTL RP

02 325432

#### REVIEW OF WHEEL-RAIL ROLLING CONTACT THEORIES

In this paper the rolling contact theories that emerged principally in the past two decades are described with special emphasis on their performance and on the ideas underlying them. Although a number of the theories are now obsolete, they all serve as a mine of ideas for those who seek to improve the present-day theory of rolling contact. Frictional contact between wheel and rail is crucial in the study of rail vehicle simulation.

The General Problem of Rolling Contact, AMD-VOL. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Kalker, JJ (Delft University of Technology, Netherlands)  
American Society of Mechanical Engineers Conf Paper 1980, pp 77-92,  
11 Fig., 2 Tab., 34 Ref.

ORDER FROM: ASME

DOTL RP

02 325433

#### CONTACT GEOMETRY ASSOCIATED WITH ARBITRARY RAIL AND WHEEL PROFILES

This paper gives the derivation of a number of results pertaining to wheel and rail geometry that are needed for the analysis of contact stresses and rolling-creepage phenomena. It is shown how the profile curves specified by engineering drawings for standard wheels and rails may be analysed to find parameters which are needed to express the pertinent equations in the various coordinate systems utilized in contact stress analysis. For arbitrarily selected points of initial contact on the wheel tread and on the railhead, it is shown how to determine the feasibility of such contact, and how to determine the mutual separation of points on the two surfaces. It is also shown how to determine the curve of interpenetration which is used as an initial estimate of the contact patch boundary associated with a given relative approach (due to elastic deformation) of the loaded wheel and rail. This analysis is the basis of a computer program (INSEP) for initial separation, and a program (INTERPEN) for the interpenetration curve.

The General Problem of Rolling Contact, AMD-VOL. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Paul, B (Pennsylvania University, Philadelphia); Hashemi, J  
American Society of Mechanical Engineers Conf Paper 1980, pp 93-105,  
9 Fig., 13 Ref.

ORDER FROM: ASME

DOTL RP

02 325434

#### ADHESION AND CREEP ZONE INVESTIGATION OF PLANAR ELASTIC STEEL ON STEEL CONTACTS WITH FRICTION--A FINITE ELEMENT ANALYSIS

To further understand the problems of tractive contact with friction, and the behavior of adhesion and creep (or slip) zones in such contacts, the relative movement and stresses between the contact surfaces of rectangular block and plate of steel under vertical and horizontal line loads is analyzed using a modification of Wilson's plane stress finite element program. Slipping of one body with respect to another is accomplished by an iterative nodal splitting technique. Solutions are obtained separately for normal and inclined loads for various coefficients of friction. It is shown that when only a normal load is acting, the adhesion zone is centrally located with the creep zone symmetrically placed on both sides. The larger the friction coefficient, the larger is the size of the adhesion zone until for a high enough coefficient, the entire contact area becomes the adhesion zone. When both normal and lateral loads are acting, the adhesion zone moves away from the center in a sense opposite to the direction of the external lateral load to an extent depending on the ratio of the vertical to lateral loads. For values above a certain ratio, the adhesion zone remains at the edge of the contact area. Relative size and movement of the adhesion and creep zones for different friction coefficients and horizontal to vertical load ratios are calculated and plotted.

The General Problem of Rolling Contact, AMD-Vol. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Kumar, S (Illinois Institute of Technology); Garg, VK (Association of American Railroads Technical Center); Annigeri, B (Pratt and Whitney Aircraft)  
American Society of Mechanical Engineers Conf Paper 1980, pp 107-119, 10 Fig., 20 Ref.

ORDER FROM: ASME

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02 325435

#### IDENTIFICATION OF WHEEL/RAIL CREEP COEFFICIENTS FROM STEADY STATE AND DYNAMIC WHEELSET EXPERIMENTS

The dynamic response and curving performance of railroad vehicles are strongly influenced by contact forces generated at the wheel/rail interface. These forces, known as creep forces, result from differential translational and rotational velocities, known as creepage, between the wheel and rail surfaces. Under controlled conditions these forces may be predicted analytically using the theory of Kalker (1), but under actual running conditions creep forces may vary considerably from the ideal. It is desirable, therefore, to be able to measure creep forces under typical operating conditions, so that realistic values for their magnitudes may be included in analyses of vehicle performance. This paper presents several techniques for measurement of creep forces on running wheelsets under steady state and dynamic conditions, and discusses practical considerations in achieving accurate results. Maximum likelihood parameter identification is demonstrated as a useful technique for extracting creep coefficient data from measurements of wheelset dynamic response to track alignment and rolling line offset inputs.

The General Problem of Rolling Contact, AMD-Vol. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Sweet, LM Garrison-Phelan, P (Princeton University)  
American Society of Mechanical Engineers Conf Paper 1980, pp 121-137, 6 Fig., 2 Tab., 24 Ref., 2 App.

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DOTL RP



02 325436

**A PARAMETRIC AND EXPERIMENTAL ANALYSIS OF FRICTION, CREEP AND WEAR FOR WHEEL AND RAIL ON TANGENT TRACK**

The importance and interrelationship of friction, creep and wear for wheels and rails of U.S. railroads and the various influencing parameters are discussed. A dimensional analysis of this relationship for clean, dry conditions yields 16 dimensionless groups. Five useful non-dimensional combinations of these have been identified as wear creep  $\pi$ , wear roughness  $\pi$ , toughness hardness  $\pi$ , creep  $\pi$  and friction  $\pi$ . Their interpretations in laboratory and field are discussed. An elementary quantitative analysis of wheel rail wear utilizing Holm-Archard relation and work energy principle has been derived. These relations validate the earlier  $\pi$ 's. A series of experiments performed on the 1/4.5 scale IIT-GMEMD wheel rail simulation facility show important aspects of wear, creep and friction relationships. They show good validity of wear creep  $\pi$  and only approximate validity of wear roughness  $\pi$ . Wheel rail wear is not quite proportional to load as generally assumed. Wear increases significantly with increasing friction. Need for further investigation of parametric relationships is pointed out.

The General Problem of Rolling Contact, AMD-Vol. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Kumar, S (Illinois Institute of Technology); Margasahayam, R (Consolidated Rail Corporation)  
American Society of Mechanical Engineers Conf Paper 1980, pp 139-155, 12 Fig., 32 Ref.

ORDER FROM: ASME

DOTL RP

02 325730

**PLATE INSTRUMENTED WHEELSETS FOR MEASUREMENT OF WHEEL/RAIL FORCES**

Strain gauge instrumented wheelsets are an important research tool in experimental rail vehicle testing. This report expounds the principle of operation of the instrumented plate type of wheelset which is constructed by the scientifically exact application of strain gauges on the plate region of railroad wheels so that the wheelset is transformed into a sophisticated force transducer. An example of the application of the principles expounded is presented for a locomotive wheelset having wheels with S-shaped plate regions and 40-in. (1016-mm) diameters. The corresponding measurement system that utilizes such instrumented wheelsets is synopsized. This information is useful to railroads and other research groups interested in measuring wheel/rail forces.

Thompson, WI, III

Transportation Systems Center, Federal Railroad Administration Final Rpt. FRA/ORD-80/58, DTS-733, Oct. 1980, 65p, 19 Fig., 3 Tab., 1 App.

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PB81-116113, DOTL RP, DOTL NTIS

02 325736

**G-SENSING DERAILMENT DETECTOR. FINAL REPORT**

This report describes procedures used to arrive at design concepts for a displacement sensitive derailment sensor. It summarizes and analyzes wheel and coupling shock and vibration data derived from over-the-road and derailment- field tests as well as data derived from computer simulations of the track environment and wheel fall from the track. Also described are physical tests of several computer-defined derailment sensor models. Based on the results of these tests, a prototype derailment sensor having an iron seismic mass which is part of a magnetic damping circuit was designed and tested in the laboratory and at the Transportation Test Center, Pueblo, Colorado. Two electronic signal processing methods are discussed which showed feasibility for monitoring seismic mass position and damping coil voltage and determining if the respective position or velocity criterion for derailment was met. Finally, a discussion and analysis of a possible means of using the rail car's vertical motion to produce electrical energy for recharging a battery to run low power signal processing circuits is presented.

Nance, P

Naval Surface Weapons Center, Department of Transportation FRA-/ORD-80/75, Oct. 1980, 69p, Figs., 3 Tab.

Contract DOT-AR-54162

ORDER FROM: NTIS

PB81-127466, DOTL NTIS, DOTL RP

02 325739

**USER'S MANUAL FOR LINEAR FREIGHT CAR FORCED LATERAL RESPONSE ANALYSIS COMPUTER PROGRAM**

This manual documents a FORTRAN IV computer program that solves for the forced lateral sinusoidal and random response of a linear, 9 degree-of-freedom freight car. The vehicle model represents the lateral dynamics of typical North American freight cars equipped with three piece trucks. Responses to both roadbed center-line alignment and cross level irregularities are computed. The response is calculated using frequency domain techniques. The steady state sinusoidal transfer functions are computed, response power spectral densities obtained and R.M.S. values found by integration of the power spectra. Plots of selected output power spectra are prepared. The manual briefly describes the vehicle and roadbed model and the solution technique. The program description, a sample run and a complete program listing are included.

Cooperrider, NK Law, EH

Arizona State University, Tempe, Clemson University, Federal Railroad Administration Intrm Rpt. FRA/ORD-80/85, Dec. 1980, 58p, 6 Fig., 1 App.

Contract DOT-OS-40018

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DOTL NTIS, DOTL RP

02 325912

**LINEAR DYNAMICS OF RAILWAY VEHICLES [Dinamica lineal de vehiculos ferroviarios]**

Increased running speeds in railway rolling stock usually lead to decreased running stability and an increase in acceleration experienced by passengers. These two effects restrict the maximum speed of trains. The article describes work carried out by the author to determine and optimize the stability and acceleration of railway vehicles designed to run on Spanish tracks. [Spanish]

AIT-Revista No. 34, May 1980, pp 13-20, 21 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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

02 325926

**THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF VEHICLE MOVEMENT AT 200 KM/H AND REQUIREMENTS FOR TRACK MAINTENANCE ON HIGH-SPEED LINES**

With an increase in speed to 200 km/h, the interaction forces between the track and rolling stock greatly increase, especially forces in the lateral direction. To assess these forces, trial runs were carried out on the Moscow-Leningrad Line with the C3 200 locomotive and ER 200 multiple-unit trains at speeds up to 200 km/h. Based on theoretical and experimental investigations, this article contains a table of recommended maintenance tolerances for the rail gauge on sections with speeds up to 200 km/h.

Ershkov, OP Kartzev, VY *Rail International* Vol. 11 No. 9, Sept. 1980, pp 489-498, 5 Fig., 6 Tab., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

02 326306

**MEASUREMENT OF WHEEL/RAIL FORCES AT THE WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY. VOLUME II. TEST REPORT**

Measurements of wheel/rail forces were made in August 1979 by the Transportation Systems Center (TSC) with the assistance of Battelle Columbus Laboratories to determine the causes of excessive wheel/rail wear experiences by the Washington Metropolitan Area Transit Authority (WMATA) Metrorail System during its first three years of operation. In addition to measuring the absolute magnitude of the wheel/rail forces, it was the intent to compare alternative methods for relieving wheel/rail wear at WMATA and other transit properties. Measurements of the wheel/rail forces were made at the Washington National Airport Test Site and the Brentwood Shop Test Site. This report describes the results of that effort. The study found that for tight gage, the average flange force between the leading outer wheel and the high rail of an 800-foot radius curve was 9400 pounds, unworn cylindrical profile; 6300 pounds, unworn tapered profile;



and 7900 pounds, worn cylindrical profile. For widened gage, the average flange force was 6300 pounds, unworn cylindrical profile and 5500 pounds, unworn tapered profile. On the basis of these results, it was recommended that cylindrical wheels be replaced by tapered wheels and tight gage curves be widened to standard gage.

See also Volume 1, PB80-212772.

Ahlbeck, DR Harrison, HD Tuten, JM  
Battelle Columbus Laboratories, Transportation Systems Center, Urban  
Mass Transportation Administration, (UMTA-MA-06-0025) Intrm Rpt.  
DOT-TSC-UMTA-80-25II, July 1980, 95p

Contract DOT-TSC-1595

ACKNOWLEDGMENT: NTIS  
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PB81-103327

02 326307

#### ANALYSIS OF WHEEL/RAIL FORCE AND FLANGE FORCE DURING STEADY STATE CURVING OF RIGID TRUCKS

The wheel/rail dynamics interaction project being conducted as part of this program is directed toward reduction of maintenance costs and wheel/rail noise while providing acceptable ride quality and safety. This report describes the development of a simple analysis procedure for estimating the conservative bounds for the wheel/rail forces and flange forces resulting from the curve negotiation of a rigid two-axle truck. The approximate analysis presented provides closed form relations for estimating wheel/rail forces, flange forces, truck angle of attack, and sliding conditions for this type of truck as a function of curve radius. The wheel profiles are modeled by conical wheel treads with vertical wheel flanges and flange friction effects are included.

Weinstock, H Greif, R  
Transportation Systems Center, Urban Mass Transportation  
Administration, (UMTA-MA-06-0025) Intrm Rpt. DOT-TSC-UM-  
TA-80-26, UMTA-MA-06-0025-80-8, Sept. 1980, 49p

ACKNOWLEDGMENT: NTIS  
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PB81-103459

02 329948

#### INFLUENCE OF RAIL HEAD CORROSION PRODUCTS ON ADHESION

While rust formed on a rail head can actually enhance adhesion under certain wet conditions, the intermediate iron ions in the rusting process may have other effects. Experiments with a friction test machine showed that the intermediate rust stages gave lower frictional coefficients than rail which was clean but wet. With dew or drizzle on the rail, the iron corrosion reaction which may be taking place can degrade wheel/rail adhesion.

Ohno, K *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 151-152, 6 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji,  
Tokyo, Japan

DOTL JC

02 329955

#### TRUCK HUNTING IN THE THREE-PIECE FREIGHT CAR TRUCK

This paper describes the design and development of a three-piece freight car truck which would be free of hunting in the normal freight car speed range with minimal modification to existing truck designs. A computer programme was developed which provided the response to parametric modifications upon the critical speed of a car. The results of the parametric studies compared favourably with previous test knowledge. It was found that by modifying the resistance to parallelogramming of warp stiffness, a simple truck design could preclude truck hunting. The paper discusses the results.

Hawthorne, VT  
American Society of Mechanical Engineers Conf Paper ASME  
79-WA/RT-14, Dec. 1979, 18p

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

02 329957

#### AERODYNAMICS AND HIGH-SPEED TRAIN OPERATION

Air around a high-speed train generates diverse forces: a steady flow causing air resistance, lateral forces and moments and thus being decisive for the energy consumption during traction; a nonsteady flow producing dynamic forces in tunnels as well as pressure disturbances which propagate with the speed of sound. The main features of these phenomena are outlined and compared with results of experiments. Within a research program promoted by the Federal Ministry for Research and Technology, knowledge could be gained using measuring and theoretical techniques of aircraft aerodynamics. In collaboration with all parties to the research project and the Swiss Federal Railways, aerodynamic measurements have been undertaken in the Heitersberg Tunnel, the results of which serve to support a tunnel theory valid up to very high speeds. [German]

Glueck, H *Glaser Annalen ZEV* Vol. 104 No. 8-9, Aug. 1980, pp 241-252

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC



03 053373

**WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDISATION. STANDARDISATION OF WHEELSETS WITH ASSEMBLED AXLEBOXES FOR WAGONS EQUIPPED WITH 920 MM DIAMETER WHEELS**

The wheelset with assembled axlebox and fitted with 920 mm wheels has been designed: for taking 22 t axleloads; to be interchangeable with existing UIC wheelsets; for use with two-axled or bogie wagons. It has: a short journal; a solid rim-sprayed wheel without offset and with curved web. The recommendations of ORE Committees B 95 (RP 3 and RP 4), B 98 (RP 9) and S 1002 (RP 2) are applicable to this standardised wheelset.

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

International Union of Railways B 136/RP 12, Apr. 1979, 37p, 14 Fig., 4 Tab.

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03 053377

**UNIFICATION OF AIR-CONDITIONING AND ELECTRICAL EQUIPMENT IN COACHES. EVALUATION OF THE TESTS CARRIED OUT TO DETERMINE THE OPTIMUM AIR CIRCULATION AND TEMPERATURE DISTRIBUTION IN A COUCHETTE COMPARTMENT**

This report deals with the tests carried out by Messrs. BBC in a couchette compartment arranged successively for night-time and daytime situations, the main object of these tests being to determine the best comfort criteria for the passenger with regard to air-conditioning arrangements to be fitted in compartments. These tests mainly consist of measuring the air speeds at different points of the compartment when varying a given number of parameters. Conclusions can be drawn concerning the influence of these different parameters.

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

International Union of Railways B 108/RP 4, Oct. 1979, 25p, 49 App.

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DOTL RP

03 053378

**TESTS ON AUTOMATIC COUPLINGS. STRENGTH STUDIES WITH THE COUPLER BODY OF THE BASIC VARIANT OF THE AUTOMATIC COUPLER 1969E FOR WAGONS**

The present report describes the strength studies made with the coupler body of the basic variant for the automatic coupler 1969e for wagons. The tests planned in accordance with the "Joint Test Programme for Strength Studies relating to the UIC/OSJD Automatic Couplers" were carried out and completed successfully. The coupler body of the basic variant of the automatic coupler 1969e for wagons fulfills the strength conditions laid down in UIC Leaflet 522 as well as the additional ones agreed upon by UIC and OSJD. The necessary reinforcements undertaken in connection with the mixed coupler in the area of the large claw do not affect the compatibility of the two UIC/OSJD coupler versions, nor do they mean a modification of the adaption principles agreed upon by the two organisations.

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

International Union of Railways B 51/RP 21, Apr. 1980, 61p, 46 Fig., 25 Tab.

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DOTL RP

03 053379

**DEVELOPMENT OF THE S1002 WHEEL PROFILE ON THE DB NETWORK**

During the period 1970 to 1976 contours were taken of the wheel profiles of intercity coaches used primarily on DB main lines. By means of these contours it is possible to see how wear develops and ascertain its effect on riding.

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

Netzger

International Union of Railways DT 81 (C116)E, Dec. 1979, 22p, 28 Fig., 1 Tab.

ORDER FROM: UIC

DOTL RP

03 053382

**VIENNA ARSENAL VEHICLE TESTING STATION. REPORT ON THE ACTIVITIES OF THE VIENNA ARSENAL VEHICLE TESTING STATION DURING 1979**

This report briefly describes the activities of the Vienna Arsenal vehicle testing station during 1979. Passenger coaches and tractive units were tested for the owner railways and for manufacturers. Two series of tests were also carried out as a continuation of the work of the ORE B 26 Specialists Committee. In addition to a series of ATP tests, investigations were also undertaken for third parties on an auxiliary power unit, and cold starting tests were carried out on motor car engines.

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

International Union of Railways AZ 30/RP 20, Apr. 1980, 29p, 8 Fig.

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03 318517

**INCREASED RAIL TRANSIT VEHICLE CRASHWORTHINESS IN HEAD-ON COLLISIONS. VOLUME I. INITIAL IMPACT**

A specific goal of safety is to reduce the number of injuries that may result from the collision of two trains. In Volume I, a two-dimensional analytic simulation model of the leading cars of two impacting transit car consists is formulated. This model is capable of simulating the mechanics of head-on initial impact of two transit cars on straight level track. Specifically, the model is capable of establishing the critical parameters which govern whether the cars crush, override, or crush with subsequent override. This simulation model is used to assess impact control devices currently in service, such as anticlimbers, couplers, and draft gear. The report also presents a detailed experimental test plan for evaluating the strength and effectiveness of future designs of impact control devices which has been developed.

See also Volume 2, PB80-205743.

Hahn, EE

IIT Research Institute, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0025) Final Rpt. DOT-TSC-UMTA-80-17-1, June 1980, 70p

Contract DOT-TSC-1052-1

ACKNOWLEDGMENT: NTIS

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PB80-205727

03 318519

**INCREASED RAIL TRANSIT VEHICLE CRASHWORTHINESS IN HEAD-ON COLLISION. VOLUME II. PRIMARY COLLISION**

A specific goal of safety is to reduce the number of injuries that may result from the collision of two trains. In Volume II, an analytical model in two dimensions, longitudinal and vertical, of the primary collision of two impacting urban railcar consists is formulated. This model includes the formulation of the leading cars developed in Part I of this program, and the distribution of mass and nonlinear force-deformation relationships existing among major structural sub-assemblages. This model also is capable of determining the extent of crushing and/or override suffered by the individual cars in the consists, as well as the time histories of displacement, velocity, and acceleration in both the longitudinal and vertical directions. Methods are developed for generating the dynamic force-deformation relationships for structural sub-assemblages comprising the critical modules of railcars. These methods include finite-element analysis, scale modeling, and full-scale testing procedures including specifications for required testing equipment and instrumentation.

See also Volume 4, PB80-205735.

Hahn, EE Walgrave, SC Liber, T

IIT Research Institute, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0025) Final Rpt. DOT-TSC-UMTA-80-17-2, June 1980, 80p

Contract DOT-TSC-1052-2

ACKNOWLEDGMENT: NTIS

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PB80-205743

03 318963

**ROSTER OF NORTH AMERICAN RAPID TRANSIT CARS, 1945-1980 SECOND EDITION)**

The document is a compilation of data on rapid transit cars built or currently on order between 1945 and 1980, and in service as of July 1980. It includes cars in the United States, Canada, and Mexico. Data includes cost, performance, dimensions, weights, electrical equipment, heating and ventilating systems, traction motors, propulsion equipment, lighting systems, and trucks and suspensions. The Roster is organized by alphabetical order. Within each section, the cars are listed in chronological order and includes cars of the following transit systems: BART-San Francisco Bay Area Transit Authority; BRTS-Baltimore Regional Rapid Transit Authority; CTA-Chicago Transit Authority; GCRTA-Greater Cleveland Regional Transit Authority; MARTA-Metropolitan Atlanta Rapid Transit Authority; MBTA-Massachusetts Bay Transportation Authority; WMATA-Washington Metropolitan AREA Transit Authority; MDCTA-Metropolitan Dade County Transportation Administration; MUCTC-Montreal Urban Community Transit Commission; NYCTA-New York City Transit Authority; PATCO-Port Authority Transit Corporation; SEPTA-Southeastern Pennsylvania Transportation Authority; STC-Sistema de Transporte Colectivo Organismo Publico Descentralizado; and TTC-Toronto Transit Commission.

See also First Edition, PB-266 620.

American Public Transit Association, Urban Mass Transportation Administration, (UMTA-DC-06-0121) UMTA-DC-06-0121-80-1, July 1980, 299p

Contract DOT-UT-60004

ACKNOWLEDGMENT: NTIS  
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PB80-213564

03 319649

**BBC WARM AIR HEATING AND ADDITIONAL VENTILATION**

A brief look is taken at the air heating and additional ventilation system in standard passenger coaches with meter gauge used in various Swiss private railways.

Amstutz, R Strub, P *Brown Boveri Review* Vol. 66 No. 12, Dec. 1979, pp 795-800, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

03 319675

**FLAME CUTTER SHOWS ITS FORM**

British Rail Engineering Ltd. in Swindon uses flame cutting extensively for profiling workpieces ranging downwards in size from main frames of shunting locomotives. An unusual use for the flame cutter is profiling blanks from which are made bearing end caps for special-purpose machines the company builds for its own needs. The end caps are needed in small quantities--no more than a dozen at one time-- and flame cutting provides an economic alternative to forging, casting or machining from the solid. They are usually cut from a mild steel billet using just one of the machine's cutting nozzles.

Kellock, B *Machinery and Production Engineering* Vol. 136 No. 3497, Jan. 1980, p 21

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 319680

**HOW TO REDUCE THE COSTS OF PRODUCTION OF ROLLING STOCK? [Jak obnizyc koszty produkcji taboru kolejowego?]**

The criteria governing the use of aluminum alloys in the construction of transport vehicles are cited. It is shown how the costs of production of rolling stock can be reduced by the introduction of a technology for the extrusion of large-size components made of aluminum alloys. Design solutions and production processes for certain types of railcars made of aluminum alloys are reviewed. [Polish]

Baranszky-Job, I *Przegląd Mechaniczny* Vol. 38 No. 23, 1979, pp 5-8, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 319929

**BR'S RAILBUS IN THE USA**

Included are technical details of the British Rail/Leyland experimental railbus and a description of its brief test in the U.S. on the Northeast Corridor and on the Boston & Maine. This Leyland Experimental Vehicle (LEV) is a two-axle self-propelled railcar. Its U.S. test was financed by the U.S. Federal Railroad Administration; subsequently a larger version was ordered by FRA for a demonstration program. Ride quality of the vehicle was generally satisfactory; instrumentation was also provided for collection of data on braking characteristics.

Griffin, T (British Rail) *Modern Railways* Vol. 37 No. 383, Aug. 1980, pp 349-351, 4 Phot.

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

03 319948

**TRUCK FRAME TESTS AT THE MECHANICAL INDUSTRIES TECHNICAL CENTRE (CETIM) [Essais de chassis de bogie au Centre Technique des Industries Mecaniques (CETIM)]**

The CETIM has a laboratory test rig which was first used for the TGV (high-speed train) truck frames. The authors briefly review the stresses to which truck are subjected, and then describe the tests and measurements completed. [French]

Faurie, J-P Monnier, P *Revue Generale des Chemins de Fer* Apr. 1980, pp 231-240, 18 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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03 319951

**RESEARCH ON THE DYNAMIC BEHAVIOUR OF T.C.B.01 TILTING BODY TRAINS [Investigacion sobre el comportamiento dinamico del tren de cajas inclinables T.C.B.01]**

Paper on research carried out on a prototype motor trainset with tilting body belonging to the RENFE. The train is made up of 4 coaches and weighs in all 200 tonnes. [Spanish]

Oliveros Rives, F Tutor Pardo, D *AIT-Revista* No. 32, Jan. 1980, pp 17-34, 31 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

03 319980

**STRUCTURE-BORNE NOISE IN PASSENGER COACHES**

In passenger accommodations of coaches the noise level must not exceed 65 dB (A) for first class and 70 dB (A) for second class. It is provable by means of the statistic energy analysis of the sound transmission, that at middle and high frequencies the air-borne noise and at low frequencies the structure-borne noise dominates. For the coach type Y is shown as an example, that the reduction of the structure-borne noise by nearly 10 dB at  $f=250$  cps by measures at the running gear and its connection to the car body or by a very good noise damping at the car body in the range of the bogies, the influence of the structure-borne noise at deep frequencies is set aside too. [German]

Toepfer, K *DET Eisenbahntechnik* Vol. 28 No. 5, May 1980, pp 193-194

ACKNOWLEDGMENT: British Railways

ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

03 319981

**DEVELOPMENT TRENDS IN ELECTRIC TRACTION FOR LOCAL TRANSPORT SERVICES**

A distinction is made in public rail transport services between rapid transit, underground, urban railways and tramways with their different roles in respect of carrying capacity, distance between halts, service speed and distinctive operating areas within the cities, in the region, or in inter-urban services. Common to all is the wish to provide an attractive service with respect to passenger comfort and convenience, traction dynamics and profitability, i.e., a low level of expenditure on upkeep and energy. New railcars must meet these requirements to a high degree. Lightweight

construction, new types of drive, electronic controls, new ideas on heating and ventilating as well as other developments make an important contribution. The successful efforts of the Association of Public Transport Enterprises to standardize many vehicle features and components will be taken into account in the further developments and will also have an influence on the design of new vehicles for foreign railways. [German]

Scholtis, G *Eisenbahntechnische Rundschau* Vol. 29 No. 4, Apr. 1980, p 277

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 319985

## IMPORTANCE OF ALUMINIUM IN THE CONSTRUCTION OF RAILWAY ROLLING STOCK

Aluminium alloys have already been used for the inside lining and fittings of railway rolling stock. The author demonstrates that, because of the development and growing complexity of rolling stock, the tendency for the tare to be increased can be offset to a large extent by employing aluminium. He then refers to the design and utilization criteria for aluminium and the solutions adopted in this field by the SNCF, the RATP and the manufacturers, and in this way provides some reliable and new references to the use of this metal in railway rolling stock. [French]

Boutonnet, JC *Revue Generale des Chemins de Fer* Vol. 99 Apr. 1980, pp 241-256

ACKNOWLEDGMENT: British Railways

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DOTL JC

03 319990

## TRACTION AND ROLLING STOCK MAINTENANCE ON THE DB

The DB operates 8,570 motive power units, 16,000 passenger coaches; 280,000 freight wagons and 16,000 service wagons. These vehicles have a replacement-cost value of about 36 billion DM. Some 2.1 billion DM, or 6 per cent of the replacement value, was spent on maintenance in 1978. The article deals with principles of maintenance and explains the maintenance system on the DB. The legislators exercise an indirect influence on the organization of the DB in that they have decreed intervals between vehicle inspections and have laid down general conditions for the system of vehicle maintenance. The essentials of the present system of maintenance on the DB are described. In technology, however, nothing is static, and in the engineers' search for new and better methods this system also is subject to dynamic laws. It is undergoing a process of optimisation in which the cost factor is an important criterion. [German]

Frerk, HW *Eisenbahntechnische Rundschau* Vol. 29 No. 5, May 1980, p 361

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 322009

## STATE OF TECHNOLOGY FOR LONG-DISTANCE TRAFFIC ON WEST GERMAN RAILROADS [Stand der Technik fuer den Fernverkehr bei der DB]

The railways are constantly competing with the other modes of transport. Efficient vehicles are among the preconditions for a competitive offer. For this purpose not the most modern but rather the economically optimum technology should be applied. The German Federal Railway does not develop its vehicles by itself; this task is largely being left to the manufacturing industry, a procedure which has proved to be satisfactory. The vehicles of the German Federal Railway meet the requirements of the market. Nevertheless a number of measures have been planned or are already being implemented with a view to further improving the competitive position of DB. This also includes an increased utilization of the benefits of intermodal transport. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Koch, P *ETG-Fachberichte* No. 4, 1979, p 155

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

03 322011

## RAILWAY VEHICLES FOR LONG-DISTANCE PASSENGER AND GOODS TRANSPORTATION: PRESENT STATE AND POSSIBILITIES OF FUTURE DEVELOPMENT

[Eisenbahnfahrzeuge fuer den Personen-und Gueter-Fernverkehr: Gegenwaertiger Stand und Moeglichkeiten Zukuenftiger Entwicklung]

Outlining the history of railways, a brief glance is cast at the development of railway vehicles for passenger and goods transportation and the objective of reducing the time required for that. The technical problems involved in achieving higher speeds are considered. The technical and economical limits of light-weight construction are also discussed. Various examples as those of the passenger coach type Bpmz or of the electric rapid trainset ET 403 illustrate the present state of the art. Transportation of goods is governed by the trend towards special purpose wagons. With respect to the running gears mention is made of the present state and the future development of bogies and their sub-assemblies. Various running gears of passenger coaches and goods wagons are described and the design principles of passenger coach high speed running gears are explained. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Waldstaetten, W von *ETG-Fachberichte* No. 4, 1979, pp 127-154

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

03 322019

## RAIL VEHICLES FOR RAPID TRANSIT SERVICE

[Schienenfahrzeuge fuer den Nahverkehr]

The requirements with regard to the design of rail vehicles for rapid transit concerning comfort, efficiency and environment. The descriptions of already built tramcars, subway cars and suburban trains are given as examples for vehicle design, car-body construction, interior design of vehicle and drivers cab as well as construction of modern bogies are briefly considered. A brief look at the future developments is presented. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Frederich, F *ETG-Fachberichte* No. 4, 1979, pp 180-194, 13 Ref.

ACKNOWLEDGMENT: EI

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03 322026

## HANDLING BULK COMMODITIES BY RAIL IN COVERED HOPPER CARS

The history of development of covered hopper cars in the U.S.A. is reviewed. The trend of freight cars in service from 1959 through 1974 is indicated and future prospects are outlined.

Krug, JA *Journal of Powder & Bulk Solids Technology* Vol. 2 No. 4, 1978, pp 28-39, 12 Ref.

ACKNOWLEDGMENT: EI

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03 322190

## CASE STUDIES ON CAR INSPECTION, CONDITIONING AND REJECTION

This report presents the results of case studies and evaluation dealing with car rejection, inspection and conditioning. These case studies have been brought together in the hopes of providing a greater insight into the difficult problem of assigning empty cars to meet shippers' requirements at the least cost. A greater understanding of this problem should lead to the development of methods that will produce a better trade-off between the cost of car rejections and the cost of preventing them.

Dingle, AD

ADD Systems, Association of American Railroads AAR R-307, Jan. 1977, v.p., 6 App.

ORDER FROM: AAR

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03 322193

**SOFTWARE SERIES: GIFWHL-USER'S GUIDE AND TECHNICAL DOCUMENTATION**

This report describes an interface package which links GIFTS-4B (an interactive, graphics-oriented, finite-element software system) to WHEEL, a finite-element program. The package is designed to produce complete card-image input decks, which can then be used for three dimensional stress analyses of railroad car wheels, by means of the WHEEL program. The user's interaction is minimized by means of computer-coded flexibilities and conveniences, which saves time and eliminates errors in data preparation, checking, and display of results. A guide to the use of the package is included, and various features are illustrated. The United States Government assumes no liability for the contents of this report, or the use thereof.

Prasad, B

Association of American Railroads Technical Center, Federal Railroad Administration AAR R-367, Mar. 1980, 74p, 9 Fig., 3 Tab., 8 Ref., 1 App.

Contract DOT-FR-64226 Sub 3.3

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

03 322197

**DETERMINATION OF OPERATING COSTS FOR FOUR RAILROAD FREIGHT CAR COMPONENTS BY SIMULATION MODELLING--VOLUME I**

This report describes an investigation, performed under Task VIII of the Track-Train Dynamics Program, concerned with costs to operate (maintain and acquire) freight car components. Four components are considered: wheels, roller bearings, bolsters, and side frames. The technique used is dynamic simulation cost modelling (SCM). Volume I describes the technique and its three elements: the schematic diagram which describes component usage, the capabilities of the computer program which implements the diagram, and the required input data set. A preliminary input data set for each of the components and the corresponding approximate results are given. These results are for the reference (present time) composite national railroad system. This reference case gives the current usage of the components and the costs to operate the components. The cost sensitivity analyses, giving the effect of each parameter on the system cost, are also given.

Krauter, AI

Shaker Research Corporation, Association of American Railroads Technical Center Tech Rpt. AAR R-431, May 1980, 76p, 5 Fig., Tabs., 7 Ref., 2 App.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

03 322504

**LIGHTWEIGHT DMU COULD CUT COSTS ON SECONDARY LINES**

Nearly 30 per cent of British Rail's 3 310 DMU cars are used on rural and local services where inadequate revenue makes it difficult to justify replacement, but they will be life-expired in the 1980s and the government has decided that most of these lines are to remain open. A prototype pair of two-axle cars is being built using Leyland bus body modules and engines.

Wakefield, FHG *Railway Gazette International* Vol. 136 No. 5, May 1980, pp 416-417, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

03 322520

**SAFETY GLASS...NO MYSTIQUE IN NEW STANDARDS**

American and Canadian railways had to cope with more than 63,000 cases of vandalism in 1978, often with serious consequences for driving staff. As a result the Federal Railroad Association has developed new standards for glass used in locomotives, coaches and cabooses in order to protect staff from stones and bullets.

*Progressive Railroading* Vol. 23 No. 5, May 1980, pp 73-74, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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

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03 322566

**TYNESIDE REPORT 8. PART 1: ROLLING STOCK**

This article is part of a series of three describing: (1) the rolling stock, (2) the construction and (3) the operation of the Tyne and Wear Metro. The Metro is of standard BR width track, using a 1500 volt DC overhead catenary. There will be 90 metro cars used, each with 84 seats per car and a crush capacity of 272 passengers. Opening of the doors installed in a 1.3 M wide aperture will be by passengers after the trainman has operated a door release button at a station. The doors can only be closed by the driver. Superb riding quality has been achieved by the use of an air body suspension and a rubber axle suspension. Drivers are able to couple and uncouple metrocars from their cabs without shunters. Control equipment, based on the air/oil camshaft uses automatic acceleration. Braking is mainly rheostatic, supplemented by electro-pneumatic disc brakes and electro-magnetic track brakes. Electronic equipment measuring the speed of each independent axle, protects the car against wheel-spin during acceleration and braking. Safety devices fitted include a passenger emergency brake and an emergency door handle. For abstracts of parts 2 and 3 of this article see IRRD nos 248773 and 248774.

Haywood, PG Price, JH *Modern Tramway and Light Rail Transit* Vol. 43 No. 509, May 1980, pp 150-156, 7 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 248772)

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

03 322646

**RAILROAD COUPLER SAFETY RESEARCH AND TEST PROJECT TECHNICAL REPORT NO. 11**

This project completed most of its assignments and was then terminated. It was to obtain information and make recommendations to improve the service reliability of couplers, knuckles and yokes. After field investigations and laboratory tests involving fatigue tests and wear analyses, it was recommended that all coupler components be quenched and tempered to improve fracture toughness, and that the following components be removed from service: Grade C steel lightweight couplers and Type F couplers cast before 1970; also all Grade B steel couplers and knuckles. Although inconclusive, there are indications that Grade E steel couplers will wear better than Grade C couplers.

Morella, NA

Association of American Railroads Technical Center Final Rpt. AAR R-394, June 1980, 48p, 22 Fig., 1 Tab., 14 Ref.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

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03 322804

**COMPETING FOR THE LIGHT-RAIL VEHICLE MARKET**

After the UMTA-sponsored Standard Light Rail Vehicle program ended in failure, North American operators looking for new light rail vehicles looked to technology evolving in Canada through the Urban Transit Development Corp. and to LRV technology existing in Europe and Japan. Details are given for the single-unit and articulated vehicles being offered to and being bought by North American transit properties.

Middleton, WD *Railway Age* Vol. 181 No. 18, Sept. 1980, p 56, 4 Phot.

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03 322823

**DESIGN AND VALIDATION OF VARIABLE RATE PNEUMATIC SPRINGS**

This paper provides information on theory and design methods used to tailor pneumatic spring rate and natural frequency. Equations utilized in the design procedure are presented, and the interaction of the important variables is discussed. The vital role of laboratory testing and validation is emphasized. Although the paper is restricted to pneumatic spring design, peripheral equipment such as leveling valves and auxiliary reservoirs are addressed.

For Meeting held February 25-29, 1980.

Burkley, TE (Goodyear Tire and Rubber Company); Myers, PF *Society of Automotive Engineers Preprints* SAE 800483, 1980, 6p

ACKNOWLEDGMENT: EI  
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03 322828

## SUSPENSION OF RAIL COACHES [Zawieszenie wagnow osobowych]

A description is given of an experimental bogie spring suspension which uses differentially coupled torsion bars. The choice of the design parameters for a system of coupled torsion bars is discussed. The results of tests of an experimental model of a spring suspension system are presented. The static and dynamic properties of this model are evaluated. [Polish]

Kebrowski, A Ofierzyski, M Sohcak, M *Przeglad Mechaniczny* Vol. 39 No. 2, Jan. 1980, pp 14-17, 5 Ref.

ACKNOWLEDGMENT: EI  
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03 322842

## TGV MAINTENANCE DEPOTS AND PROGRAMMES TAKE SHAPE

The planning programs and projects of French National Railways to operate fast train services of the Train a Grande Vitesse (TGV) on the new Paris-Lyon line and the plans made to meet the intensive maintenance requirements of the fleet with minimum downtime are discussed.

Shirres, DAJ (British Rail) *Railway Engineer International* Vol. 5 No. 2, Mar. 1980, pp 34-37

ACKNOWLEDGMENT: EI  
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DOTL JC

03 322911

## MEASURING THE GEOMETRIC CHARACTERISTICS OF WHEEL SETS BY OPTICAL METHODS [Vasuti kerekparok geometriai jellemzoinek optikai meresi modszerei]

Presentation and comparison of the different measuring methods used in the manufacture and maintenance of wheel sets. The culminating point of the work was the development of a single instrument for balancing both drive and trailer wheelsets. [Hungarian]

Zoller, J *Kozlekedestudomanyi Szemle* Vol. 30 No. 1, Jan. 1980, pp 18-26, 1 Tab., 10 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Lapkiado Vallalat, Lenin korut 9-11, 1073 Budapest 7, Hungary

03 322922

## NEW LOW-LOADER WAGONS FOR THE "ROLLENDE-LANDSTRASSE" PIGGYBACK SYSTEM [Neue Niederflurwagen fuer das Huckepack-system "Rollende Landstrasse"]

No Abstract. [German]  
Petzoldt, G *Eisenbahntechnische Rundschau* Vol. 29 No. 1-2, Jan. 1980, pp 57-67, 10 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 322931

## FACTORIAL ANALYSIS OF WEAR PHENOMENA ON TIRES OF ELECTRIC LOCOMOTIVES [Faktornyj analiz processov iznashivaniya bandazej kolesnyh par elektrozovov]

Presentation of the mathematical model of wear of electric locomotive tires, together with a recommendation for evaluation of wear as a function either of the distance covered or of the operational life of the electric locomotive. [Russian]  
Isaev, IP *Vestnik VNIIT* No. 4, 1980, pp 22-26, 1 Fig., 4 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

03 322944

## FLEET SERVICING FACILITIES FOR SERVICING, MAINTAINING, AND TESTING RAIL AND TRUCK RADIOACTIVE WASTE TRANSPORT SYSTEMS: FUNCTIONAL REQUIREMENTS, TECHNICAL DESIGN CONCEPTS AND OPTIONS COST ESTIMATES AND COMPARISONS

This is a resource document which examines feasibility design concepts and feasibility studies of a Fleet Servicing Facility (FSF). Such a facility is intended to be used for routine servicing, preventive maintenance, and for performing requalification license compliance tests and inspections, minor repairs, and decontamination of both the transportation casks and their associated rail cars or tractor-trailers. None of the United States' waste handling plants presently receiving radioactive wastes have an on-site FSF, nor is there an existing third party facility providing these services. This situation has caused the General Accounting Office to express concern regarding the quality of waste transport system maintenance once the system is placed into service. Thus, a need is indicated for FSF's, or their equivalent, at various radioactive materials receiving sites. In this report, three forms of FSF's solely for spent fuel transport systems were examined: independent, integrated, and colocated. The independent concept was already the subject of a detailed report and is extensively referenced in this document so that capital cost comparisons of the three concepts could be made. These facilities probably could service high-level, intermediate-level, low-level, or other waste transportation systems with minor modification, but this study did not include any system other than spent fuel. Both the Integrated and Colocated concepts were assumed to be associated with some radioactive materials handling facility such as an AFR repository.

Watson, CD Hudson, BJ Keith, DA Preston, MK, Jr McCreery, PN Knox, W Easterling, EM Lamprey, AS Wiedemann, G Allied-General Nuclear Services May 1980, 150p

Contract AC04-76DP00789

ACKNOWLEDGMENT: Energy Research Abstracts  
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ORNL/SUB-79/13866/1

03 323208

## NEW FACILITIES FOR INCREASED TRAFFIC AT ALLIANCE

As part of Burlington Northern's preparation for increased coal traffic in unit trains from Montana and Wyoming, a \$46 million car and locomotive facility has been installed at Alliance, NE. In addition to describing this facility for repairing 1000 cars and maintaining 60 locomotives daily, this article also discusses the "fast track" basis for designing and constructing this shop to assure it would be in place as BN train movements increased.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House, Chicago.

Woxland, MO (Burlington Northern, Incorporated) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 390-401, 6 Fig.

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03 323218

## TRACK RELATED PERFORMANCE GUIDELINES AND ECONOMIC ANALYSIS OF HIGH-CAPACITY COVERED HOPPER CAR DESIGNS

The economic benefit associated with use of a high-performance/high-cube covered hopper car is discussed. The method of economic evaluation is explained and its application to a conservatively designed car situation is included. The major emphasis is comparison of the suggested car to current 100-ton covered hopper cars and a limited comparison to a lighter 80-ton car. The three alternatives are examined in terms of rail wear, fuel, accident potential, and maintenance, but is not intended to be the basis for a choice between 80 and 100 ton cars in a specific service.

Proceedings of the Seventy-ninth Technical Conference, AREA, held March 24-26, 1980, Palmer House Chicago.

Hargrove, MB (Association of American Railroads) *AREA Bulletin* Vol. 81 No. 678, June 1980, pp 588-599, 1 Fig., 7 Tab.

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03 323222

## BN PROGRAMS KEEP COAL CARS MOVING

Strict new-car standards, an extensive preventive maintenance program, and careful running repairs are intended to keep running smoothly the 30,000



hopper and gondola cars used in unit coal train service at the end of 1980. These BN cars accumulate 70,000 to 140,000 miles annually. Following an introduction, two longer articles-- Upgraded Standard for BN cars and Car Maintenance Important, Too--give details on BN design and maintenance practices. BN feels that AAR Mechanical Division car standards are often minimal, not always even adequate for general interchange service and certainly not for unit-train equipment. Since much of unit-train maintenance expense involves running gear, BN stresses specifications for wheels, bearings, truck and brakes. Details are given on requirements for virtually every component of carbodies also on these hoppers and gondolas. Preventive maintenance involves four special shops and a rigorous schedule which calls for components to be repaired or renewed in multiples of a basic 200,000-mile overhaul cycle.

*Progressive Railroading* Vol. 23 No. 9, Sept. 1980, pp 101-104, 7 Phot.

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

DOTL JC

03 323224

**RUGGED RAILGON**

The first of 4000 gondola cars composing Trailer Train's new Railgon fleet have been delivered. These rugged 100-ton high-side gondolas operate in a pool free of car service rules applying to cars owned by individual railroads. Extra strength was put in the car floor, sides, ends, corners and running gear. A special corner post arrangement involves pin connections between top chords at sides and ends to counter impact loads without bowing car ends.

*Progressive Railroading* Vol. 23 No. 9, Sept. 1980, pp 125-126, 6 Phot.

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

DOTL JC

03 323227

**FREIGHT CARS: SEEKING NEW SOLUTIONS**

Greater specialization and the search for better net to gross load ratios will continue to be major factors affecting freight car design in the present decade. But manufacturers and railways will continue to seek solutions to the negative problem posed by specialization: long and costly empty car runs when return loads of the right type cannot be found. One solution is to design a car which, though highly specialized, can quickly be adapted for a different return load.

*International Railway Journal* Vol. 20 No. 8, Aug. 1980, pp 27-29

ACKNOWLEDGMENT: British Railways

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DOTL JC

03 323229

**SHARPLY-CURVED METROS OFFERED CHEAP CROSS BRACED BOGIE**

Many metro and light rail operators experience severe flange and rail wear in sharply-curved routes. To overcome this problem it is necessary to get the axles to adopt a radial attitude on sharp curves. British Rail's Research & Development Division has taken the successful cross-braced freight bogie and adapted it for rapid transit use by incorporating an improved secondary suspension and redesigning the frame to accommodate traction motors. Two of these bogies are undergoing extensive running trials.

Illingworth, R *Railway Gazette International* Vol. 136 No. 8, Aug. 1980, pp 692-694

ACKNOWLEDGMENT: British Railways

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DOTL JC

03 323231

**SYSTEMS APPROACH TO FAILURE RESISTANT CAST STEEL RAILROAD CARWHEEL DESIGN**

This paper describes the systems approach used in the design of a more failure-resistant cast steel railroad carwheel. Control of fracture toughness in high carbon steel is discussed and data are presented. Aspects of design geometry which produce lower thermal and mechanical stresses are discussed. The use of finite element computer models and full scale verification, including destructive drag dynamometer tests, are described. Consideration is given to computer solidification models and also to manufacturing constraints.

Haley, MR *ASME Journal of Engineering Materials & Technology* Vol. 102 No. 1, Jan. 1980, pp 26-31

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

03 324400

**LATEST LARGE-CAPACITY WRECKING CRANES**

The paper describes the functions and construction of large-capacity wrecking cranes equipped with a power lowering system for lowering of hoisting and lowering of boom, hydraulic outriggers, and moment limiters.

Okasaka, K Ishige, R Kakinuma, T *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 31-34

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 324401

**LATEST DIESEL ELECTRIC LOCOMOTIVES AND DIESEL HYDRAULIC LOCOMOTIVES**

Principal specifications and description of technological innovations are given for the latest diesel electric locomotives and industrial diesel hydraulic locomotives. The latter are serialized by the classes: low noise type, semiexplosion type, very low speed type, automatic train operating type and automatic inspection and monitoring devices.

Watanabe, J Mori, M Hatakawa, I Nakamori, K *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 13-18

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 324405

**BUCKLING OF RAILWAY WAGON FRAMES**

This paper presents the analysis of the three dimensional space frame with arbitrary configuration and loading. The conventional stiffness method is modified into an iterative technique to take into account the effect of axial force in magnifying the flexural deformations. The theory predicts the buckling loads of the frame of box-type freight car and 4-wheeler undercarriage frame used by Indian Railways.

Kulkarni, SS Basole, MM *Railway Engineer International* Vol. 5 No. 3, May 1980, pp 50-52, 9 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

03 324412

**LIGHT WEIGHT CARBODY FOR ADVANCED URBAN MASS TRANSIT RAIL CARS**

The paper describes light weight mass transit car with air conditioning equipment, with specific reference to the carbody. It also refers to the results of strength analysis of the carbody structure by the three dimensional FEM as well as to riding quality evaluation, noise control, and the air conditioning system.

Tanaka, M Terada, K *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 7-12, 1 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

03 324441

**A YARD TEST OF ACOUSTIC SIGNATURE INSPECTION OF RAILROAD WHEELS**

An earlier laboratory study established the feasibility of using acoustic signatures for inspection of railroad wheels. The present work was undertaken to establish the system's operational capabilities by a period of testing in a switching yard. Tape recordings were made to serve as a data base for finding the algorithm which best distinguished wheel sets with a defective member. Wheelsets whose members exhibited extremely different wear could not always be distinguished from those with a cracked wheel. It is anticipated that when the measure of differential wear on a wheelset has been incorporated in the algorithm its ability to distinguish cracked wheels will be considerably improved.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.



Dousis, DA Finch, RD (Houston University)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-2,  
1980, 6p, 9 Fig., 3 Ref.

ORDER FROM: ESL

DOTL RP

03 324442

## SUPER SERIES WHEEL CREEP CONTROL SYSTEM

In 1976, EMD completed an extensive four-year research program which investigated the wheel-rail, friction-creeper relationship of a locomotive. In parallel with this program, a developmental program was initiated in 1973 to design a locomotive control system which would take advantage of the information and conclusions from the friction-creeper study. In 1978 and 1979, EMD built 32 prototype locomotives with a new wheel control system. This control system, known as "Super Series," provides an increase of approximately 33 percent in utilization of available adhesion over conventional locomotive wheel slip systems. This paper presents the "Super Series" Wheel Control-System and how the system relates to and controls the series wound traction motor. Included is a brief discussion of the conclusions from the friction-creeper study and how these conclusions became the design parameters for the "Super Series" system. Test and operational results taken from performance of the prototype locomotives are included.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Meyer, BR De Buhr, AP (General Motors Corporation)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-3,  
1980, 9p, 9 Fig., 1 Ref.

ORDER FROM: ESL

DOTL RP

03 324445

## FATIGUE ANALYSIS OF RAILROAD FREIGHT CAR TRUCK BOLSTER

Fatigue analysis of a railroad freight car truck bolster was performed. The method of analysis incorporated finite-element static stress analysis, rain-flow counting technique and cumulative damage theory. Design improvements were brought about through deformation analysis and the final design reanalyzed with the fatigue process.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Cooley, DB Shieh, GP (Standard Car Truck Company)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-6,  
1980, 8p, 9 Fig., 4 Ref.

ORDER FROM: ESL

DOTL RP

03 324448

## CYCLIC BEHAVIOR OF CLASS U WHEEL STEEL

In order to evaluate the material properties of Class U wheel steel under cyclic loading, low-cycle fatigue tests were conducted at room temperature of specimens taken from the rim of the wheel. The test results show that Class U wheel steel experiences significant cyclic softening at lower strains, but cyclically hardens at larger strain levels. Due to the cyclic softening at lower strain levels, the steel will plastically deform, even at stresses of about one-half of the monotonic yield strength. Quantitative fatigue properties, which can then be used to predict accurate fatigue lives of various components of wheels under complex service environments, are also obtained from the low-cycle fatigue tests.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Park, YJ Stone, DH (Association of American Railroads Technical Center)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-9,  
1980, 6p, 8 Fig., 6 Tab., 5 Ref.

ORDER FROM: ESL

DOTL RP

03 324450

## PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1979-1980 REPORT OF SURVEY COMMITTEE)--CARS AND EQUIPMENT

This survey of the annual ASME report covers some of the major developments in rail freight and passenger equipment made public in the last calendar year. It covers developments worldwide.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Hawthorne, KL (Association of American Railroads Technical Center);  
Fisher, FG (STV Engineers)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-11,  
1980, 14p, 39 Fig.

ORDER FROM: ESL

DOTL RP

03 324451

## PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1979-1980 REPORT OF SURVEY COMMITTEE)--LOCOMOTIVES

This report covers motive power designs that have been delivered and developments undertaken in the survey period of September 1, 1979 to September 1, 1980. Data and photographs for seven new diesel locomotives, six new electric locomotives, six trainsets and three railcars are presented as reported by builders, railroads and trade journals.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Baker, PH Schulze, FW (General Electric Company)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-12,  
1980, 10p, 16 Fig., 2 Tab., 13 Ref.

ORDER FROM: ESL

DOTL RP

03 324490

## WANTED: MILLION-MILE LOCOMOTIVE

A survey of chief mechanical officers has indicated the shortcomings of existing locomotives and features that need to be incorporated in future motive power. Generally recent units are seen as having greatly improved reliability and maintainability, the products of research and development on the part of locomotive builders. The roles of horsepower, adhesion control, truck design, a-c traction motors and full electrification are still being weighed.

Roberts, R *Modern Railroads/Rail Transit* Vol. 35 No. 10, Oct. 1980, pp 42-45, 3 Phot.

ORDER FROM: ESL

DOTL JC

03 324502

## UNIT TRAIN OPERATION DEMANDS PREVENTIVE MAINTENANCE OF WAGONS

After a hectic period in which rising traffic continually outstripped facilities, slackening of demand for iron ore has allowed Mount Newman Mining to implement preventive maintenance of wagons that average 140 000 km a year. Conditions on the Pilbara ore lines are tough, with 18 000 tonne trains and 30 tonne axleloads. While unit trains are simple to operate, they present a special hazard in terms of epidemic failures because a large number of components such as coupler heads may reach a critical point in terms of fatigue life simultaneously. This makes tracking of components essential, and a computer has been installed for this purpose.

Walker, WD *Railway Gazette International* Vol. 136 No. 9, Sept. 1980, pp 778-780

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

03 324507

## VEHICLE TECHNIQUES FOR HIGH-SPEED PASSENGER SERVICES

A consideration of vehicle dynamics with respect to the attainable speeds with various modes of transport shows that for tracked systems, especially



the wheel-and-rail-system, passenger demand can be met for journey distances of up to about 450 km where the top speed is about 250 km/h and the mean distance between stations is 65 km. The vehicle system for this is a train with two power units with four drive-wheel sets each and drawing up to ten coaches, similar to the present IC services, and capable of carrying 600 to 650 passengers. It should also be streamlined for low aero-dynamic resistance. Continuing research with respect to running dynamics and the best drive arrangement must have the objective of obtaining vehicles which produce only small forces in interaction with the track even at high speeds so as to achieve low-wear economical operation. [German]

Rappenglueck, W *Eisenbahntechnische Rundschau* Vol. 29 No. 7-8, July 1980, p 525

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

### 03 324909

#### BOMBARDIER MAKES TOMMORROW'S TRAIN TODAY

Bombardier Limited, Montreal produces locomotives, passenger railcars, and diesel-electric power units. The article describes manual, semiautomatic, and automatic welding to join steel and aluminum alloys.

Birchfield, JR *Welding Design and Fabrication* Vol. 53 No. 5, May 1980, pp 61-67

ACKNOWLEDGMENT: EI

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DOTL JC

### 03 324923

**THE DEVELOPMENT OF TRUCKS ON NETHERLANDS RAILWAYS (NS). AIMS, RESULTS AND FUTURE PLANNING FROM THE POINT OF VIEW OF RUNNING TECHNIQUES, CONSTRUCTION AND MAINTENANCE** [Die Drehgestellentwicklung bei den Niederlaendischen Eisenbahn AG(NS). Zielsetzungen, Ergebnisse und weitere Aussichten aus lauftechnischen konstruktiven und unterhaltungstechnischen Gesichtspunkten] No Abstract. [German]

Rolfs, FH *Leichtbau der Verkehrsfahrzeuge* Vol. 24 No. 3, 1980, pp 66-73, 22 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

### 03 324926

#### PASSENGER STOCK: COMFORT IS FIRST

Speed and comfort are the two criteria for successful operation of passenger services in the eighties. The railroad companies are already aware that their services compare favorably with the motor car and even in some cases with air services. Lighter weight construction gives higher speeds and the latest progress in bogie design gives added comfort.

*International Railway Journal* Vol. 20 No. 8, Aug. 1980, p 41, 18 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013

DOTL JC

### 03 324928

#### FLAW INSPECTION OF ROLLING STOCK AXLES AND OTHER PARTS

Prevention of accidents is of foremost importance on the JNR's major routes such as the new Shinkansen lines designed for high speeds and heavy traffic. During periodic inspections therefore, each component of the equipment is examined on site. The article describes ultrasonic and magnetic crack inspection procedures.

Kubo, S *Japanese Railway Engineering* Vol. 20 No. 1, 1980, pp 9-13, 16 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

### 03 324935

#### THE NEW SNCF 1ST CLASS VU 78 COACHES WITH COMPARTMENTS [Les nouvelles voitures de 1ere classe a compartiments VU 78 de la SNCF]

Description and characteristics of the new 60-seat A 10-type 1st class coaches with compartments, first introduced at the beginning of 1980. [French]

Jousserandot, P *Revue Generale des Chemins de Fer* Sept. 1980, pp 493-498, 2 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

### 03 325279

#### DEEP WELL INTERMODAL CAR

A multi-unit articulated car with deep wells between trucks has been introduced by Budd for handling trailers and containers through the most restricted of overhead clearances. The low profile car can consist of two to ten units and standard components are used for all parts that will require periodic servicing. To increase torsional rigidity, much use is made of tubular sections in the structures. Fuel economy is enhanced by the lightweight and the lower center of gravity.

*Progressive Railroadng* Vol. 23 No. 12, Dec. 1980, pp 58-59, 4 Phot.

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

DOTL JC

### 03 325438

#### CAR REPAIR: THE NEW DYNAMIC

This special report discusses the contract car repair shop. It looks at the origins and early growth of nonrailroad car lines and leasing companies, along with the repair shops they spawned. The existing contract car repair industry is examined and the future trends are suggested. North American Car, the largest such operation, is then described with attention to both facilities and capabilities. The future of freight car supply and car leasing are then discussed.

*Modern Railroads/Rail Transit* Vol. 35 No. 11, Nov. 1980, p 19

ORDER FROM: ESL

DOTL JC

### 03 325710

#### FEASIBILITY OF SPECIAL STRUCTURAL DESIGN OF LOCOMOTIVES AND RAILCARS TO IMPROVE COLLISION SAFETY AT LEVEL CROSSINGS

This report examines the potential of using structural techniques to reduce fatalities in railway/road vehicle collisions. A review of the state-of-the-art of crossing problems concludes that the preferred solution-grade separation-is very expensive. This approach could cost Canada at least \$18 billion, if all crossings were grade separated. The problem is therefore of the cost benefit type. The available data examined included statistics, other studies, road safety work, and results of impact tests. Based on these limited available data, an acceleration factor at the point of impact was selected and gross concept sizes for various conditions were defined. Further work is required to reconcile the very limited test data with actual experience. However, the potential for improvement by structural design is good. One test of a system was located. Additional work is required on alternate approaches and to minimize railroad operational constraints.

Railroad-Highway Grade Crossings: Update, Bibliography 58.

Dilworth, Secord, Meagher & Associates Limited Rpt. 789/920, June 1978, 54p

ORDER FROM: Transport Canada Research and Development Centre, 1000 Sherbrooke Street, West, P.O. Box 549, Montreal, Quebec H3A 2R3, Canada

### 03 325713

#### ISSUES AND DIMENSIONS OF FREIGHT CAR SIZE: A COMPENDIUM

An investigation is made into the effects of the size, weight, and length of freight cars on the safety and efficiency of U.S. rail transportation. A review is made of the historical and present population and usage of the U.S. freight car fleet. Distinct trends toward the purchase of larger, heavier cars and the

subsequent effect on the fleet are shown. Several data bases are used in a novel fashion to provide actual derailment rates for the fleet by car-miles and ton-miles as functions of various parameters, including car type, nominal weight capacity, and length. A key finding is that, historically, the use of 100-ton capacity freight cars, in itself, has not been detrimental to the safety of U.S. rail transportation. An overview of current analyses of the causes of derailments is given, with special considerations to tank car accidents and grade-crossing accidents. Based on these analyses, technical measures for improvement are outlined. In culmination, a series of options available to the government and industry is given, with consideration to technical, regulatory, and economic impacts.

Nayak, PR Palmer, DW  
Little (Arthur D), Incorporated, Federal Railroad Administration Final  
Rpt. FRA/ORD-79/56, ADL-80589-11, Oct. 1980, 299p, Figs., Tabs., 6  
App.

Contract DOT-FR-74261

ORDER FROM: NTIS

PB81-116998, DOTL NTIS, DOTL RP

03 325737

## THERMAL SENSING UNIT TEST FOR RAILROAD CAR JOURNAL BEARINGS

The report is a summary of the temperature work done by the Naval Surface Weapons Center (NSWC) in support of the Department of Transportation, Federal Railroad Administration development of a thermal sensing unit used to detect overheating railroad journal bearings. The temperature related field work was conducted by Mr. A. M. Spangler of NSWC, now retired. The author, who was assisting him in the laboratory tests and has compiled this summary report, acknowledges his efforts. The test series included measuring the temperature of a railroad journal assembly during actual operation, reproducing field conditions in the laboratory for sensor development testing, and testing the thermal sensor in actual use. Normal operating temperature, over-heated bearing temperatures, and several journal surface temperatures were measured during field operation. The data obtained was used in determining the subsequent laboratory test parameters. A hot plate temperature test was used for testing the sensor in the early stages of development. Existing laboratory facilities were modified to provide simulated field temperature inputs to a partial side frame and journal assembly for confirmation tests. Data from all field and laboratory tests is included.

Donley, ME  
Naval Surface Weapons Center, Federal Railroad Administration Final  
Rpt. FRA/ORD-80/76, NSWC/WOL/TN 10527, Oct. 1980, 27p, 17 Fig.,  
3 Tab.

Contract DOT-AR-54162

ORDER FROM: NTIS

PB81-127458, DOTL NTIS, DOTL RP

03 325748

## PETROLEUM STORAGE AND TRANSPORTATION CAPACITIES. VOLUME IV. TANK CARS/TRUCKS

In this report of the Tank Cars/Trucks Task Group, a demographic breakdown and a geographic analysis of the US rail tank car fleet, and the number of tank vehicles, with a capacity in excess of 3500 gallons, which might be called upon to safely haul petroleum products (including LPG and LNG) in the event of a national emergency are presented. In the appendices there are detailed information on DOT tank cars suitable to haul petroleum in an emergency, geographic distribution of tank cars, NPC 1979 survey of tank vehicles, and tabulation of NPC 1979 tank vehicle.

National Petroleum Council 1979, 82p

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: National Petroleum Council, 1625 K Street, NW, Washington, D.C., 20006

03 325881

## USER'S MANUAL FOR THE MAINTENANCE COST METHODOLOGY FOR HIGH SPEED PASSENGER TRAIN TRUCKS

This document is a user's manual for the simulation cost modeling (SCM) technique as applied to a passenger railcar truck and its component parts. The manual includes application of the technique through the development

of an example maintenance schematic diagram, example truck component cost data, and example maintenance procedures. The computer program and its various operating modes are described with the aid of a full set of example data obtained from Amtrak personnel. A complete listing of the FORTRAN IV program and a set of example data for its operation are contained in the appendices. A set of cost results from the example Amtrak data cover maintenance expenditures by maintenance actions and by component truck subassemblies. Also listed in the sample results are a set of cost sensitivities related to the modeled maintenance system. In addition to the present application, the SCM technique has been employed successfully for other railroad systems, including track maintenance. The technique is generally useful for fleets in which individual cost data are not available, such as a proposed transit system or the introduction of new sub-systems or components.

Smith, RL Krauter, AI Betor, J  
Shaker Research Corporation, Federal Railroad Administration Final  
Rpt. FRA/ORD-80/70, DOT-TSC-FRA-80-21, Sept. 1980, 252p, 20 Fig.,  
1 Tab., 2 Ref., 14 App.

Contract DOT-TSC-1619

ORDER FROM: NTIS

PB81-115479, DOTL NTIS, DOTL RP

03 325886

## ROLE OF INNOVATIVE ENGINEERING IN RAIL OPERATIONS

Engineers were deeply involved in both construction and operation of early railroads. The situation has changed today to the degree that it is suggested that the best solutions to operating problems may not be employed. Three different examples of innovative engineering solutions to the problems on a major commuter railroad are given: development of a chemical toilet servicing system, productivity of the inspection function, and energy conservation. The need for familiarity of all types of engineering, need to really understand operation, and the need to sell new concepts within the institutional structure are stressed.

Proceedings of the Special Conference-Broadening Horizons, Transp and Dev Around the Pacific, Honolulu, Hawaii, July 21-23, 1980.

Eisele, DO (Long Island Rail Road)  
American Society of Civil Engineers 1980, pp 138-147

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE

03 325907

## WROUGHT STEEL WHEELS AND FORGED RAILWAY AXLES

The manual contains manufacturing practices for wrought steel wheels, wheel technology, wheel specifications, descriptions of forged railway axles, manufacturing practices for forged railway axles and axle specifications.

Taken from the American Iron and Steel Institute Steel Products Manual.

American Iron and Steel Institute Sept. 1979, 133p

ACKNOWLEDGMENT: EI

ORDER FROM: American Iron and Steel Institute, 1000 16th Street, NW, Washington, D.C., 20036

03 325911

## TRENDS IN LAVATORIES ON RAIL VEHICLES [Evolution des WC equipant le materiel ferroviaire]

Background account of types used up to now by various railways. Research trends on the SNCF. Operating principles of watertight or semi-open lavatories currently being used, researched or tested. [French]

SNCF-Direction de Materiel-Agence RMT Est SNCF Cat. 41 P1, 1980, 32p, Figs., Tabs., Photos., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: SNCF-Direction du Materiel-Agence RMT Est, 92 rue Bonaparte, 75 Paris 6e, France

03 325919

## MODERN WAGON REPAIR METHODS ON THE SZD [Moderne Methoden der Instandsetzung von Gueterwagen bei den SZD]

Over the last 10 years, the SZD has developed and introduced modern car repair methods. The result has been improved techniques and organization, better labor productivity and higher standards of repair. The author gives full details of the production line as the basis for sophisticated repair techniques. [German]



Boroday, S *Zeitschrift de OSShD* Vol. 23 N3-131, 1980, pp 1-3, 1 Ref.  
 ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

03 325922

#### AIR-CONDITIONING EQUIPMENT IN COACHES [Klimaanlagen in Reisezugwagen]

With higher running speeds and commercial requirements, air-conditioned coaches are needed. A description is given of how an air-conditioning system works and is built, taking particular account of air flow and refrigeration. Different systems are shown, especially those with one or two ducts and development trends mentioned. [German]

Brenneisen, J *Elektrische Bahnen* Vol. 78 No. 8, Aug. 1980, pp 214-221, 14 Phot., 12 Ref.

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

DOTL JC

03 325929

#### DESIGNING WORKSHOPS WITHIN METRO PARAMETERS

Good workshop design is essential to ensure the smooth day-to-day running of a metro, as poor maintenance will immediately affect car availability. The Layout and equipment chosen for the workshops of the Hong Kong and Caracas metros show how tough operating requirements can be met.

Sheldon, J *Railway Gazette International* Vol. 136 No. 9, Sept. 1980, pp 770-774, 3 Fig., 1 Tab., 8 Phot.

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

DOTL JC

03 325936

#### IMPROVEMENT OF PERFORMANCE AND RATIONALISATION OF THE TECHNICAL SERVICES FOR WAGONS ON THE GERMAN FEDERAL RAILWAY [Leistungsverbesserung und Rationalisierung im technischen Wagendienst der Deutschen Bundesbahn]

For technical monitoring of freight cars and containers in operation, maintenance and cleaning, DB employs 4,500 rolling stock inspectors in its car inspection department and 7,500 male and female staff in the car cleaning department. To improve performance and rationalize these tasks, a new system for inspecting cars and containers in operation has been set up and will be subjected to various tests. A similar study is being carried out in the coach inspection department. Since 1979 staff have been trying out a new cleaning system, which is expected to be officially introduced in 1981. [German]

Molle, P *Die Bundesbahn* Vol. 56 No. 9, Sept. 1980, pp 601-609, 5 Tab., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

03 326305

#### MASSACHUSETTS BAY TRANSPORTATION AUTHORITY BLUE LINE VEHICLE EVALUATION

The report presents the results of engineering tests carried out on a pair of rapid transit cars for the Massachusetts Bay Transportation Authority. The tests were performed at the Transportation Test Center, Pueblo, Colorado, from April 1979 through October 1979. The scope of the test program included an evaluation of performance, ride quality, and interior and wayside noise, using standardized test procedures; special engineering tests were made to evaluate energy conservation methods and three types of experimental brake shoes. The tests showed that the vehicles met their design specification requirements with some deficiencies, notably in emergency braking rates. An energy conservation technique was evaluated, in which response characteristics of the vehicle propulsion system were modified to reduce energy needs due to aerodynamic drag at high speeds. Several potential energy-saving configurations were identified, with minimal impact on round-trip times. The experimental brake shoes tested were found to give performance comparable to the original equipment at normal operating speeds for the MBTA Blue Line, but were inferior at higher speeds.

Balaster, A Arnold, G Simmonds, K Francis, K  
 Federal Railroad Administration, Urban Mass Transportation Administration  
 Final Rpt. FRA/TTC-80/05, July 1980, 241p

Contract DOT-FR-67001

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB81-102949, DOTL NTIS

03 326380

#### RAIL CAR COMPONENT DEFECT DETECTION USING PITLESS RAILWAY SCALES (A FEASIBILITY STUDY PLAN)

This report presents a feasibility study plan to help establish the practicality of utilizing modified pitless-in-motion rail scale systems to detect faulty railroad car components and component systems. This plan considers detecting critical components and performance conditions such as: lateral and vertical rail forces, defective wheels, brakes and bearings, centerplate friction, consist speed, hunting, creep, rock and roll.

Raskin, SH

Raskin (SH) Corporation, Federal Railroad Administration  
 Final Rpt. FRA/ORD-79/50, Sept. 1980, 101p, 7 Fig., 5 Tab., 5 App.

Contract DOT-FR-8003

ACKNOWLEDGMENT: NTIS

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PB81-110090, DOTL NTIS, DOTL RP

03 326399

#### TRUCK DESIGN OPTIMIZATION PROJECT (TDOP) PHASE II

The overall objective of the TDOP Phase II project is to characterize the behavior of existing trucks (defined as Type I trucks) and to generate performance and test specifications for new truck designs (referred to as Type II trucks). The purpose of this document is to report on the progress to date of TDOP Phase II. The report summarizes the methodology employed to develop performance and test specifications and the rationale used for selecting seven Type II trucks for field testing. The Interim Report also discusses preliminary conclusions reached in several economic areas, including car and truck maintenance costs, fuel consumption, and rail wear in curves. Further, the report describes on-going field test programs (the truck performance testing and wear measurement programs) and the completed Friction Snubber Force Measurement System test program. In the analysis area, an assessment and validation of 17 computer simulation models of freight cars is discussed in detail. The Interim Report concludes with a description of the work-in-progress for a Type I truck performance characterization.

See also PB80-175995.

Sheldon, G Bakken, G Cappel, K Gibson, D Gilchrist, A  
 Wyle Laboratories, Federal Railroad Administration  
 Intrm Rpt. FRA-/ORD-80/59, TDOP/TR-12, June 1980, 105p

Contract DOT-FR-742-4277

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB81-104945, DOTL NTIS

03 326415

#### METROLINER TRUCK IMPROVEMENT PROGRAM

The report summarizes the results of design and ride testing procedures followed in developing a Metroliner Truck Improvement Program. The Metroliner cars had been used in high speed Corridor service for nearly ten years and upgrading the truck suspension to modern standards for improved passenger ride was considered to be very desirable. Preliminary design projections indicated this could be accomplished at comparatively modest cost and with potential savings in maintenance costs by modifications only to the primary and secondary spring systems.

Seely, RM

General Steel Industries, Incorporated, Federal Railroad Administration  
 Final Rpt. FRA/ORD-80/74, Sept. 1980, 66p

Contract DOT-FR-64237

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB81-113714, DOTL NTIS

03 329949

## UTILIZATION OF EIGHT AXLE FREIGHT CARS OF LARGER SIZE [Vnedrenie vas'miosnyh vagonov uvelicennyh gabaritov]

The USSR Railways proposes to put in service an eight axle freight car of large size, approved by the Ministry, in view of meeting the requirements of heavier traffic in the near future. [Russian]

*Zheleznodorozhnyi Transport* No. 6, 1980, pp 70-71

ACKNOWLEDGMENT: International Union of Railways, BD

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

03 329967

## THE RAILBOUND BUS [Der Spurgefuehrte Omnibus]

In order to improve public transport the Daimler-Benz company in cooperation with the Federal Ministry for Transport and Technology has developed a bus-rail system, known as the O-Bahn. Other firms taking part are Bosch, Dornier, Man. Buses are tested which may be manually driven or may run on rails (duo-bus-system). The vehicle can always drive in the most favourable mode of application. It can be driven by batteries in urban areas without any exhaust gas emission or may be linked to an overhead electricity supply system. In the outer areas of cities it may be driven by a diesel generator unit. [German]

Seifert, E *Polizei Technik Verkehr* Vol. 24 No. 5, 1979, pp 248-249, 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 311923), 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

04 318271

**OVERVIEW OF A STIRLING ENGINE TEST PROJECT**

The Lewis Research Center is conducting tests on three Stirling engines ranging in size from 1.33 to 53 horsepower (1 to 40 kW). The results of these tests are contributing to the development of a broad base of Stirling engine technology. In addition, the tests are directed toward developing alternative, backup component concepts to improve engine efficiency and performance or to reduce costs. Some of the activities include investigating attractive concepts and materials for cooler-regenerator units, installing a jet impingement device on a Stirling engine to determine its potential for improved engine performance, and presenting performance maps for initial characterization of Stirling engines. Some of the experimental results to date and predictions of results of tests that will be conducted on these Stirling engines are presented.

Slaby, JG

National Aeronautics and Space Administration, Department of Energy  
NASA-TM-81442, 1980, 27p

Contract EC-77-A-31-1040

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

DOE/NASA/1040-80/12

04 318490

**PROPOSED ANALYSIS METHODOLOGY FOR RAIL CAR PROPULSION SYSTEM SELECTION**

This report proposes a rail car propulsion system selection methodology based on life cycle costing. The objective of the proposed methodology is to provide transit operators with a practical method of calculating propulsion system life cycle costs to be used in bid evaluation of different rail car propulsion and control system technologies. If life cycle costing is to become part of the car acquisition process, it is important that the methodology is known and accepted by the suppliers and purchasers. The analysis methodology as presented here is to some extent based on previously applied methods and includes results from new work performed for this project. In this report, recent railcar propulsion system procurement practices and other related information were reviewed, and discussions were held with propulsion system suppliers and various operating systems. Results of this research were used in the development of the propulsion system evaluation and selection methodology, and the structured application of life cycle costing.

Bamberg, W Eldredge, D

Lea (ND) and Associates, Incorporated, Urban Mass Transportation  
Administration Tech Rpt. UMTA-IT-06-0229-80-1, May 1980, 50p

Contract DOT-UT-60069

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-201460

04 318621

**FUEL CELLS FOR ELECTRIC UTILITY AND TRANSPORTATION APPLICATIONS**

This review encompasses the following topics: (1) historical, (2) types of fuel cells, (3) thermodynamic and electrode kinetic aspects of fuel cells, (4) overview of present status of fuel cell research and development, (5) electrocatalysis of fuel cell reactions, (6) fuel cell/battery hybrid vehicles, and (7) regenerative hydrogen-halogen fuel cells for energy storage. citation 05:024234)

Seminar on electrochemical systems: batteries and fuel cells, Fortaleza-Ceara, Brazil, 2 Mar 1980.

Srinivasan, S

Brookhaven National Laboratory, Department of Energy CONF-  
800324-2, 1980, 30p

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

BNL-27452

04 319650

**'BO'BO' THYRISTOR LOCOMOTIVES CLASS GE 4/4 III OF THE FURKA-OBERALP RAILWAY**

A class of the very powerful locomotives for narrow gauge railways is presented. Main circuits, auxiliaries, and control electronics of the locomotives are outlined.

Filipovic, Z *Brown Boveri Review* Vol. 66 No. 12, Dec. 1979, pp 778-787, 3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 319651

**RACK-MOUNTED, TRANSISTORIZED BATTERY CHARGER FOR ELECTRIC LOCOMOTIVES**

The construction, operation and applications, are described of the new type battery chargers for a.c. locomotives.

Taoavica, K *Brown Boveri Review* Vol. 66 No. 12, Dec. 1979, pp 801-803

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 319666

**DEVELOPMENT OF AN EXPERIMENTAL INVERTER-INDUCTION MOTOR DRIVE FOR RAILWAY TRACTION USE**

The use of ac motor-inverter drives for railway vehicles has grown steadily. The development described is being carried out by an equipment manufacturer and a railway authority to check the practicalities of ac drives in railway conditions. The new train-borne equipment provided consists of twin inverters supplying traction motors of two types. Initially the dc input will come from an existing 25kV 50Hz controlled rectifier; later stages of test will use a 750V dc third rail supply. DC transistor choppers are used in advance of the current fed inverters. Dynamic rheostatic braking is provided over part of the speed range.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Siddall, RB (GEC Traction Limited, England)

Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 93-99, 16 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

04 319667

**TORQUE OSCILLATIONS IN TRACTION DRIVES WITH CURRENT-FED ASYNCHRONOUS MACHINES**

An asynchronous machine supplied by an inverter with nonsinusoidal currents generates an internal torque, which is the superimposition of a constant torque with an oscillating torque is discussed. If the torque harmonics coincide with the mechanical resonances of the mechanical power transmission, a pulse-current modulation is needed in order to avoid problems. At a laboratory test set-up measurements have been performed. Some of the results are presented.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Lienau, W (Technical University of Aachen, West Germany)

Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 102-107, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

04 319668

**MULTIAXLE AC TRACTION DRIVES USING THYRISTOR CONVERTERS**

New systems for multi-axle ac drives are described. The power converter in this system consists of a two quadrant chopper current source and a three-phase current source inverter. The choice of current source inverter is based on its simplicity and reliability.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Dewan, SB (Toronto University, Canada); Slemon, GR

Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 108-111, 7 Ref.



ACKNOWLEDGMENT: EI  
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

## 04 319669 SOME DESIGN ASPECTS OF THYRISTOR CHOPPERS FOR USE IN RAIL TRACTION

The requirements for thyristor choppers for railway traction use are considered. A prototype chopper that meets the requirements is discussed.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Farrer, W (Brush Electric Machines Limited); McLoughlin, PD  
Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 116-121, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

## 04 319671 INERTIA LOAD SIMULATOR FOR TRACTION SYSTEMS

This simulator was developed in order to study traction systems where wheel slip and slide, bogie weight transfer, adhesion limits and gradients present a complex motor loading situation. Adding realistic controls and route storage would also permit driver training. In this new simulator a single dc machine is used to load the traction motor in motoring or regenerating modes, with a microprocessor controlling the whole operation. This method permits a change of locomotive braking system, bogie, route, etc., by merely reprogramming the appropriate subroutines resulting in a versatile cheap general purpose simulator.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Bowler, P (Manchester University, England); Marques dos Santos, JC  
Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 165-170, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

## 04 319672 VARIABLE FREQUENCY TRACTION DRIVE WITH INVERTER FED INDUCTION MOTOR FOR RAPID TRANSIT ELECTRIC TRAINS

Direct current motors are going to be replaced by variable frequency inverter-fed-asynchronous motors thanks to their undeniable advantages. It goes without saying that the electric equipment is to be devised as a whole, in order to reach a real optimization for the design of each component. An explanation is provided for the choices that must be made in order to obtain the optimization of the two basic components of this traction system, that is the inverter and the asynchronous motor.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Giubergia, S (Ansaldo, Italy); Rossi, C Tortello, E  
Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 98-101, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

## 04 319674 CLASS EE 6/6 II CONVERTOR LOCOMOTIVES OF THE SWISS FEDERAL RAILWAYS

The paper describes the static convertor type locomotive that uses a four-quadrant power controller that practically excludes interference effects on the catenary system.

Roffler, M *Brown Boveri Review* Vol. 66 No. 12, Dec. 1979, pp 764-777, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

## 04 322012 ELECTRIC TRACTION FOR RAIL-BOUND RAPID TRANSIT SYSTEMS [Antriebstechnik fuer den Schienennahverkehr]

The development of electric traction equipment for tramways, light rapid transit and underground railways was greatly influenced in the last 20 years by semiconductor technology. This produced semiautomatic electronic running and braking controls, as well as the d.c. choppers and three-phase equipment. The d.c. chopper equipment permits continuous and low-loss control of motor voltage both for running and braking, with even good control of regenerative braking. With three-phase traction, the conventional d.c. motor is replaced by a maintenance-free squirrel-cage induction motor. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Wagner, R Gathmann, H Voss, U *ETG-Fachberichte* No. 4, 1979, pp 195-209

ACKNOWLEDGMENT: EI  
ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

## 04 322013 ELECTRIC DRIVE TECHNOLOGY FOR INDUSTRIAL LOCOMOTIVES [Elektrische Antriebstechnik fuer Industriebahnen]

After a brief historical survey, it is shown on some examples how the German electric industry, in cooperation with advanced locomotive manufacturers, utilizes to an optimal extent the solutions possible in the current rectification technology and supplies the industrial users with appropriate designs of locomotives with high traction power and reliability. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Tietze, C Wittmann, H *ETG-Fachberichte* No. 4, 1979, pp 265-275, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

## 04 322017 MODERN DRIVE TECHNOLOGY OF ELECTRIC LOCOMOTIVES FOR LONG-DISTANCE TRAFFIC [Moderne Antriebstechnik Elektrischer Triebfahrzeuge fuer den Fernverkehr]

Due to the progressive development in power and control electronics, the technology of the driving systems used in long-distance traffic is getting still more efficient, at the same time reducing the maintenance costs. By giving some examples, the possibilities arising for switchgear, undulating current and three-phase locomotives effects are shown. The topics covered range from the problems of the reactions on the supply system to the adhesion conditions between wheel and rail. The technical prerequisites are being approached from the angle of the technology of the driving systems for long-distance and high-speed traffic. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Koerber, J Dreimann, K Loessel, W *ETG-Fachberichte* No. 4, 1979, pp 76-91, 16 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

## 04 322018 HYDRODYNAMIC POWER TRANSMISSION FOR DIESEL SHUNTING LOCOMOTIVES [Hydrodynamische Kraftuebertragung fuer Dieselrangier-Lokomotiven]

Electric and hydraulic transmission systems and their significance for diesel shunting locomotives is considered. Technical development of the hydrodynamic power transmission, is illustrated by the example of the turbo-reversing transmission of the Voith type. The improvement of tractive effort and braking force characteristics and the effect of this on the design of industrial locomotives with maximum speeds up to 40 km/h and multi-purpose locomotives for mixed shunting and main line operation with maximum speeds of 60 to 70 km/h. is pointed out. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortr., Hamburg, Germany, June 12-14, 1979.

Paetzold, W *ETG-Fachberichte* No. 4, 1979, pp 254-263

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

04 322020

**MODERN LOCOMOTIVES FOR FACTORY SIDINGS [Moderne Lokomotiven fuer den Verkehr auf Werks-und Anschlussbahnen]**

For the special operating conditions of industrial and dock railways and sidings the German locomotive industry offers an efficient and up-to-date program of robust and economical diesel locomotives with hydrodynamic power transmission. The basis is a standardization concept that has been established by the representatives of the railways and manufacturers and covers the power range from 400 to 1,000 kW. Special emphasis was laid on economy by cutting maintenance costs, ergonomics and prevention of accidents. Some examples of locomotives delivered are shown. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortr., Hamburg, Germany, June 12-14, 1979.

Ditting, G *ETG-Fachberichte* No. 4, 1979, pp 212-227

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

04 322021

**HIGH-POWERED DIESEL ENGINES FOR LOCOMOTIVES [Verbrennungskraftmaschinen hoher Leistung fuer Lokomotiven]**

The development of diesel engines for locomotives is described. [German] Schieneverkehr-Zukunft mit Vernunft, Fachvortr., Hamburg, Germany, June 12-14, 1979.

Beer, P *ETG-Fachberichte* No. 4, 1979, pp 107-125

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

04 322027

**POWER CONVERTERS FOR FEEDING ASYNCHRONOUS TRACTION MOTORS OF SINGLE-PHASE AC VEHICLES**

An investigation of converter configurations for controlling asynchronous induction motors is presented. Three different types of static power converters for electric locomotives and motor coaches are described: a) indirect converter with direct voltage link, b) indirect converter with direct current link, and c) direct converter with suppressed direct current link.

Lienau, W Mueller-Hellmann, A Skudelny, HC *IEEE Transactions on Industry Applications* Vol. IA-16 No. 1, Jan. 1980, pp 103-110, 14 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

04 322029

**ECONOMIC VALIDATION OF NEED FOR DEVELOPMENT AND INTRODUCTION OF STREET CAR ARRESTORS WITH IMPROVED CHARACTERISTICS**

Problems pertaining to the fault rate or traction and auxiliary streetcar electric motors is considered for faults produced by various factors, including surge voltages. The economic necessity for development and introduction of nonlinear-resistance arrestors with improved characteristics is demonstrated.

Alekseeva, RM Alekseev, SA Khalilov, FK Shilina, NA *Power Engineering (USSR Translation)* Vol. 49 No. 12, 1978, pp 99-102

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 322042

**LATEST INDUSTRIAL DIESEL HYDRAULIC LOCOMOTIVES**

The standard and special models of diesel hydraulic locomotives are described. The standard models are serialized, ranging in weight from 20 to 80 tons. The special models include low-noise type, semiexplosion-proof type, very low speed type, remote control type, and unattended type

locomotives. For higher efficiency in maintenance and inspection, some of the locomotives are equipped with a monitoring device using microcomputers.

Hatakawa, I Nakamori, K *Hitachi Review* Vol. 28 No. 6, Dec. 1979, pp 333-336

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 322055

**THREE-PHASE DRIVES--THE MANY ADVANTAGES WHICH PASSENGER URBAN TRANSIT CAN OBTAIN**

The author shows that three-phase electric traction embodies among its advantages the squirrel-cage induction motor which has higher efficiency than the comparable dc machine. Thyristor control gives power variations, braking and speed/torque characteristics by varying the frequency. Experience data on three-phase induction traction motors are presented and new rapid transit vehicles are outlined.

Scholtis, G *Rail Engineering International* Vol. 8 No. 4, Oct. 1979, pp 122-126

ACKNOWLEDGMENT: EI

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DOTL JC

04 322507

**TESTS ON THE THREE-PHASE CURRENT DRIVE SYSTEM FOR MOTIVE POWER UNITS OPERATED WITH 50 HZ CURRENT [Erprobung des stromgefuehrten Drehstromantriebssystems fuer 50 Hz-Triebfahrzeuge]**

An old DB dual current E 182 series electric locomotive was used for these tests. In the input circuit, the three-phase current systems consists of a suppressable bridge connection which is semi-controlled asymmetrically in the intermediate circuit, a reactance coil and, in the current converter, a static inverter with suppression of the intermediate phases. Two installations of this type each with a 1.1 MW rating are planned to drive two axles. A new "Geaflex" coupling system with three interlocking guide rings has been developed for transmission of three-phase current between the traction motor and the axle. [German]

Boehm, H Zoellner, F *Elektrische Bahnen* Vol. 78 No. 4, Apr. 1980, pp 86-92, 6 Fig., 3 Tab., 1 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

04 322516

**TRENDS IN THE DEVELOPMENT OF AXLE DRIVE MECHANISMS FOR LOCOMOTIVES [Tendenzen der Entwicklung der Achsantriebe fuer Lokomotiven]**

The amount of power to be transmitted by wheelsets is continuously rising, so practicable solutions must be found. Two lines of improvement are open. One is to improve the reliability of conventional transmission by adopting improved technological procedures and using the most up to date construction methods; the other is to develop new types of transmission. Different proposals are made regarding this problem. [German]

Masnev, MM *DET Eisenbahntechnik* Vol. 28 No. 5, 1980, pp 181-183, 4 Fig., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

04 322523

**TOLERANCE BAND REGULATED PULSE CONVERTER FOR E 120 LOCOMOTIVE POWER SUPPLY [Toleranzbandgeregelter Pulsstromrichter fuer eine Einspeiseschaltung der Lokomotive E 120]**

A brief description of the circuit is given, followed by an explanation of the control and setting principles involved. The repercussions on the network, which are minimal, are shown using oscillograms and frequency spectra. [German]

Klinger, G *Elektrische Bahnen* Vol. 78 No. 4, Apr. 1980, pp 98-99, 5 Fig., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

04 322524

## THE ENERGY ASPECTS OF THREE PHASE CURRENT PROPULSION FOR A.C. LOCOMOTIVES [Energetische Aspekte des Drehstromantriebes fuer Wechselstromlokomotiven]

The three-phase locomotive with a 50 Hz supply frequency can only be constructed in an economical manner by using semiconductor techniques. One disadvantage is the poor power factor, and the article discusses circuits to improve this. Three-phase current propulsion opens up new prospects. [German]

Schulze, R. *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 27 No. 1, 1980, pp 188-193, 8 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

04 322525

## USE OF THREE-PHASE CURRENT IN MOTIVE POWER UNITS [Einsatz der Drehstromtechnik in Triebfahrzeugen]

The three-phase current propulsion technique has opened new perspectives for electric drive systems on board locomotives. Static inverters connected to power supply circuits compatible with the network allow the use of universal locomotives. The E 120 locomotive is a particularly striking example of this. The author describes the technology of the components used and initial results obtained with these locomotives and other vehicles as well as the extensive work required to perfect the technique. One of the main aspects dealt with is the economic advantages from the manufacturing and operating standpoint. [German]

Selbach, A. *Eisenbahningenieur* Vol. 31 No. 6, June 1980, pp 254-266, 7 Fig., 1 Tab., 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

04 322528

## THREE-PHASE CURRENT PROPULSION WITH SQUIRREL-CAGE WINDING CONVERTORS FOR RAIL VEHICLES [Drehstromantrieb mit Stromzwischenkreisumrichter fuer Bahnfahrzeuge]

Developments in electronics have made it possible to build converters for use with three-phase current propulsion. Converters with a squirrel-cage winding are particularly advantageous, because they can be easily adopted to the power supply network by using the appropriate connection. Phase series static inverters with 6 thyristors, 6 diodes and 6 condensers are the simplest type of converter. They have a continuous rating of 900 kW when air-cooled. Appropriate values for the economic viability of static converters are given for several applications. [German]

Ziegler, W. *Elektrische Bahnen* Vol. 18 No. 5, May 1980, pp 123-128, 4 Fig., 7 Ref.

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

DOTL JC

04 322905

## SOLID-FUEL RAILROADING IN THE '80S?

A two-unit, coal-fired reciprocating steam locomotive for unrestricted service has been proposed by a fledgling firm, American Coal Enterprises, as motive power which could take advantage of the widening gap between per-BTU costs of coal and diesel fuel. While the compound engine consists of conventional components, the steam generating unit, condenser and fuel-supply concepts would differ substantially from traditional practices and produce a thermal efficiency of up to 15 percent, more than double that of America's final steam locomotives. Promoters are seeking funding for a complete design and a prototype.

Armstrong, JH. *Railway Age* Vol. 181 No. 19, Oct. 1980, pp 36-37, 1 Phot.

ORDER FROM: ESL

DOTL JC

04 322912

**METHODS FOR TESTING AXLE-DRIVE WITH NOSE SUSPENDED MOTOR EQUIPMENT [Metody badan diagnostycznych zespolu napedu osi przy silniku zawieszonym "za nos"]**  
The author describes the monitoring center for evaluating the technical state of traction vehicle transmission systems set up by the Warsaw Railway Research Institute as part of a general railway vehicle monitoring program. The monitoring centers test clutch rigidity in wheel sets equipped with Alsthom type transmission, the peripheral rigidity of the transmission spring rings and the suspension of motors in the bogie chassis when the motor support is of the tram type. [Polish]

Zmijewski, A. *Trakcja i Wagony* Vol. 2-26 No. 10, Oct. 1979, pp 275-282, 10 Fig., 1 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

04 322921

**LOGICAL STEPS FOR DETECTING AND ELIMINATING DAMAGE IN ELECTRIC LOCOMOTIVES OF THE VL 10 SERIES [VL 10: Logicheskie shemy po obnaruzheniju i ustranjeniju neispravnostej]**  
No Abstract. [Russian]

Proskurina, NA. *Elektricheskaya i Teplovoznaya Tiaga* Vol. 5 No. 281, May 1980, pp 26-33, Figs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

04 322926

**HIGH-POWER CARDAN SHAFTS FOR RAILWAY VEHICLES, ESPECIALLY HIGH-SPEED RAILCARS [Hochleistungsgelenkwellen fuer Schienenfahrzeuge, insbesondere fuer Triebzuege hoher Fahrgeschwindigkeit]**

An account of the development principles for high-power cardan shafts and their appraisal, construction and resistance testing. Cardan shafts have recently been installed in high-speed electric tractive units in the transmission mechanism between the traction motor and the wheelset. In this way the motor can be fitted in the body and the weight of the truck kept low. [German]

Mueller, H. *Leichtbau der Verkehrsfahrzeuge* Vol. 24 No. 1, 1980, pp 11-14, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

04 322929

**TRENDS IN THE DEVELOPMENT OF PROPULSION PARTS OF ELECTRIC RAILWAY VEHICLES [Trend der Entwicklung von Vortrieben elektrischen Schienenfahrzeugen]**

A comparison of different types of design suggest that three-phase current propulsion with a converter would be the most economical for the future, in terms of energy consumption and maintenance requirements. It is also very quiet and allows for stable running. [German]

Kuhlow, J. *Elektrische Bahnen* Vol. 78 No. 6, June 1980, pp 146-150, 9 Phot., 18 Ref.

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

DOTL JC

04 322957

**LOCOMOTIVE DATA ACQUISITION PACKAGE PHASE II SYSTEM DEVELOPMENT. FINAL REPORT. VOLUME 2. LDR OPERATIONS AND MAINTENANCE**

An examination of the problems associated with railroad locomotive data acquisition is presented. The design of a minicomputer based locomotive data acquisition system is also presented. Special attention is placed on meeting the functional characteristics and environmental specifications required for the system. The system described consists of a magnetic tape digital data recorder, an ensemble of transducers, and analysis software. The system described is to be used as a research tool. This volume discusses the operation and maintenance of the Locomotive Data Recorder (LDR).



Abbott, RK Kirsten, FA Mullen, DR Sidman, SB Miller,  
JG Ng, LS  
California University, Berkeley Mar. 1980, 108p  
Contract W-7405-ENG-48

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

LBL-10636(Draft2)

#### 04 323226

##### MOTIVE POWER: SOLID-STATE TECHNOLOGY TAKES OVER

Introduction of solid-state electronics in traction systems is likely to prove the most important advance in motive power during the present decade. The use of thyristors and electronics in general has already produced great improvements in power utilization, making it possible to eliminate power dissipation at start-up and to make fuller use of both traction and adhesion. Automatic regulation of train speeds has also made it possible to use the simpler, more reliable, asynchronous motor more widely. And power for ancillary on-board services, such as air-conditioning and lighting can be taken from the pantograph through static converters.

*International Railway Journal* Vol. 20 No. 8, Aug. 1980, pp 19-23

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

#### 04 323432

##### MODULAR PULSE CONVERTER TURBOCHARGING PROCESS AND EXHAUST VALVE FACING TEMPERATURE

Exhaust valves and turbochargers are today the two main obstacles to the development of diesel engines. Researches made up to now in the turbocharging field had led to conclude that the multipulse system was the most suitable from the engine performance standpoint when the constant pressure system was the more economical. The idea to gather the advantages of both systems has led S. E. M. T. to design and develop a modular pulse converter system (MPC) in which each cylinder feeds a single exhaust pipe of reduced diameter through ejector. The single exhaust pipe feeds the turbocharger at constant pressure.

Presented at ASME Meeting 3-7 February, 1980.

Magnet, JL Curtil, R *American Society of Mechanical Engineers Papers*  
ASME 80-DGP-4, 1980, 17p, 6 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 04 324410

##### EVAPORATION COOLING SYSTEM FOR CHOPPER CONTROLLER

The natural convection type evaporation cooling system for chopper controllers with high-power semiconductor cells is presented. It overcomes the drawbacks of the conventional chopper controller of the forced air cooling system by preventing noise from blowers; obviating the need for blower maintenance and air filter cleaning and replacing; and eliminating dust and soil on insulator surfaces. The system has been applied to chopper controllers for dc electric cars with a complex main circuit constitution and semiconductor cell control mode.

Yamada, Y Itahana, H Okada, S *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 25-30, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 04 324411

##### INDUCTION MOTOR PROPULSION SYSTEM FOR TRANSIT CARS

The paper describes the inverter-controlled induction motor driving system for transit cars and the results of the running tests. The system is found to have many merits suitable for electric car drive.

Katta, T (Teito Rapid Transit Authority); Tsuboi, T Ibamoto, M Shimizu, Y *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 19-24, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 04 324415

##### NEW POWER EVALUATION OF TRACTIVE MOTOR VEHICLES AND THREE-PHASE DRIVE TECHNIQUES [Neue Leistungsbewertung von Triebfahrzeugen und Drehstrom-Antriebstechnik]

Beginning with the rating of tractive units, the author proposes a new definition of power values in order to obtain a better classification for the operational usability of electric tractive units, based on these values. A survey is given of the systems and components of electric tractive units with three-phase current traction motors, including a special consideration of the class 120. [German]

Bauermeister, K (German Federal Railway) *Elektrische Bahnen* Vol. 78 No. 2, Feb. 1980, pp 38-45, 1 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

#### 04 324416

##### SIXTEEN CYLINDER DIESEL IDLES ON EIGHT

Engineers at Cummins Engine Co. have developed a new sixteen cylinder turbocharged and after-cooled diesel engine which develops 1190 kW (1600 bhp). The KTA-3067 has a displacement of 50 liters with a 159 mm bore and stroke. This engine shares many commonalities with the K-family V-12 engines, but it contains a patented fuel control valve which shuts off eight of the sixteen cylinders during warmup and light load-low speed operating conditions to reduce white smoke.

*Automotive Engineering* Vol. 88 No. 4, Apr. 1980, pp 73-76

ACKNOWLEDGMENT: EI  
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#### 04 324427

##### INTERACTION BETWEEN CONVERTER AND VEHICLE DRIVE. CONSIDERATIONS AND RECENT INVESTIGATIONS OF THREE-PHASE DRIVES [Wechselwirkung Zwischen Umrücker und Fahrzeugantrieb. Betrachtungen und Neuere Untersuchungen zur Drehstromantrieben]

The use of the three-phase induction motor drive for rail vehicles is considered. Research activities in West Germany are reported which showed that due to new cooling systems, for instance cooling by heat pipes or by water, the weight of three-phase induction motors has been reduced to 33% of the conventional 16 2/3-Hz-traction motor. The importance of oscillating torques is discussed, along with feeding of induction motors for traction with a constant current converter. [German]

Sattler, PK *Elektrische Bahnen* Vol. 78 No. 2, Feb. 1980, pp 30-38, 9 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

#### 04 324443

##### MECHANICALLY BONDED RADIATORS FOR LOCOMOTIVE RELIABILITY

Locomotive radiator design has been significantly enhanced by the introduction of the mechanically bonded flat/round tube radiator. This construction combines the rugged and highly reliable rolled mechanical tube-to-header joint with a flat tube matrix of high thermal efficiency. This paper discusses the principles of the mechanically bonded design radiator and compares it with the design of the solder bonded brass header radiator. Very high reliability of this radiator and other locomotive heat exchangers using rolled mechanical tube-to-header joints is reviewed in the context of field experience. Finally, reliability and the required repair frequency of the tin-lead solder and mechanically bonded flat/round tube radiator are compared to demonstrate that over the life of the locomotive, it is more economical to equip a locomotive with the flat/round tube mechanically bonded radiator.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Ali, MW Meyer, DE (General Motors Corporation); Young, FM (Young Radiator Company)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-4, 1980, 19p, 17 Fig.

ORDER FROM: ESL

DOTL RP

04 324883

## INPUT CHARACTERISTICS OF NATURALLY COMMUTATED SINGLE-PHASE ASYMMETRICAL CONVERTORS

Thyristor control is increasingly being used for voltage control on ac-supplied traction vehicles. Although such equipment improves the traction performance, it also introduces disturbances into lineside signalling and telephone circuits. The input characteristics of single-bridge and multi-bridge asymmetrical converter circuits are defined. Using the equations developed, the harmonic spectrum of the traction current can be predicted and subsequently used for noise and disturbance calculations.

Mellitt, B (Birmingham University, England); Mwandosya, MJ *IEE Proceedings Part B* Vol. 127 No. 2, Mar. 1980, pp 107-116, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

04 324921

## THREE-PHASE CURRENT TRACTION MOTORS FOR RAILWAY VEHICLES OVER ALMOST A CENTURY [Drehstrom-Fahrmotoren fuer Schienenfahrzeuge seit nahezu einem Jahrhundert]

The article shows the developments which have taken place in three-phase current traction motors as propulsion systems for railway vehicles, starting from the first usable three-phase current motor built in 1891 and going right up to the three-phase current technique applied to the E120, of which the DB has provisionally ordered 5 prototypes. [German]

Stempina, G *Eisenbahntechnische Rundschau* Vol. 29 No. 4, Apr. 1980, pp 287-291, 8 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

04 324925

## MODERN TRACTIVE UNITS--ACCORDING TO GERMAN INDUSTRY'S MANUFACTURING PROGRAMME [Neuzeitliche Triebfahrzeuge]

After a summary of the drive systems in use at the present time a review of tractive units manufactured over the last ten years is given. After more than ten years of development the asynchronous three-phase current motor with converter has become one of the most widely used and universally recognised traction systems. [German]

Pleger, J *Eisenbahntechnische Rundschau* Vol. 29 No. 6, June 1980, pp 439-452, 8 Phot., 16 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

04 324934

## LOCOMOTIVES FOR THREE-PHASE CURRENT TRANSMISSION [Lokomotiven fuer Drehstromuebertragung]

Previous tests with three-phase current motors are described, along with study of transmission from wheel to rail of traction and braking forces. Criteria are given for synchronous and asynchronous motors. A Brown Boveri (BBC) process in connection with converters for producing variable frequencies for running control. Henschel BBC-DE 2500 system for universal locomotives with asynchronous alternating current motors: diesel locomotives, locomotives with overhead lines, dual energy-source locomotives. Test program: running behaviour, supply of direct and alternating current to the overhead contact lines. Possibility of standardising elements in diesel and electric locomotives. [German]

Kademann, S *Thyssen Technische Berichte* Vol. 11 No. 1, 1979, pp 8-14, 12 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: August Thyssen-Huette AG, Zentrale Forschung der Thyssen-Gruppe, Postfach 67, Duisburg-Hamburg, West Germany 4100

04 324941

## REGENERATIVE BRAKING OF ELECTRIC MOTIVE POWER UNITS [Nutzbremsung von elektrischen Triebfahrzeugen]

From the running diagram of a motive power unit and the energy balance sheet drawn up in parallel, it is seen that the introduction of regenerative braking is mainly advisable for tractive units in short-distance traffic. Suburban rolling stock is generally equipped with d.c. tractive units, for which a detailed explanation of the technique of fitting the regenerative brake is given. Numerous measurements conducted on the installations described confirm that considerable energy savings (20 to 30 percent) can be made on trams, urban railways and metropolitan railways. To conclude, the corresponding technique for a.c. motive power units is described.

Wagner, R *Siemens-Energietechnik* Vol. 2 No. 7, 1980, pp 284-288, 6 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Springer Verlag, Heidelberger Platz 3, 1000 Berlin 33, West Germany

04 325446

## MULTIPLEXING CAN REDUCE ON-TRAIN CABLING

Techniques used to transmit several controls and indications over a few pairs of wires are being applied by London Transport to multiple-unit trains. Though distances are short, multiplexing not only cuts the number of inter-car and inter-unit jumpers, it also reduces the space and weight of cabling within each car. Two batches of rolling stock have used multiplexing for indications only, and experiments are being carried out with controls also. Lessons learned from 1973 subway cars include the need to separate electronic decoding and processing equipment from the indication panel in the cab, as the failure modes are essentially different.

Harding, MA *Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1066, 3 Fig., 2 Phot.

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DOTL JC

04 325735

## RAILROAD ELECTROMAGNETIC COMPATIBILITY LOCOMOTIVE VOLUME 1, SUMMARY OF E-60 CP ELECTROMAGNETIC EMISSION YARD MEASUREMENTS

Results of electromagnetic emission measurements performed on E-60 locomotives at AMTRAK's Wilmington, Delaware, Maintenance facility are presented. A description of the measurements and methodology employed is included.

O'Neill, DJ (IIT Research Institute)  
Electromagnetic Compatibility Analysis Center, Federal Railroad Administration Intrm Rpt. FRA/ORD-80/66.I, ECAC-CR-80-027, Oct. 1980, 178p, Figs., 3 Tab.

ORDER FROM: NTIS

PB81-117988, DOTL NTIS, DOTL RP

04 325894

## INVERTER BLOCKS WITH AIR-COOLED DISK CELLS FOR RAILROAD APPLICATIONS [Stromrichtersaetze mit Luftgekuehlten Scheibenzellen fuer Bahnanwendungen]

In inverter blocks used in railroad applications the flat bottom cells are replaced by disk cells. The resulting mechanical, thermal and electrical design problems are discussed. Various circuit versions, compact or modular, are used to illustrate the state of the art. [German]

Ackermann, B Thron, D Linsenmaier, H *AEG Telefunken Progress* Vol. 69 Nq. 5-6, 1979, pp 210-215

ACKNOWLEDGMENT: EI  
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04 325895

## DC CONTROL FOR RAPID TRANSIT TRANSPORTATION [Gleichstromsteller fuer Nahverkehrsfahrzeuge]

The development of urban transportation in the last years has been characterized by replacement of electromechanical components by electronic ones. The paper deals with the output control in dc-supplied vehicles carried out by a thyristor circuit which is reliable and easy to maintain. [German]

Hohmuth, G Klotz, H Uhthoff, R *AEG Telefunken Progress* Vol. 69 No. 5-6, 1979, pp 202-209, 7 Ref.

ACKNOWLEDGMENT: EI  
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04 325896

**DIESEL RAILCARS FOR CEYLON GOVERNMENT RAILWAY**

Commuter type diesel railcars are described. One unit train consists of four cars—one power coach, two trailer coaches, and one trailer control coach. The railcars feature modern electronic control system which enhances operating efficiency, performance reliability and accuracy. Description is given of basic railcar systems and equipment.

Nakamura, M Ohashi, M Asaba, S *Hitachi Review* Vol. 28 No. 2, Apr. 1979, pp 95-100

ACKNOWLEDGMENT: EI  
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04 325898

**HEATING OF THE CONVERTER-FED ASYNCHRONOUS MOTOR [Erwärmung des Umrichtergespeisten Asynchronmotors]**

The heating of stator and rotor of an asynchronous machine is limited in the rotor by the strength of the squirrel cage and possibly by the heating of adjacent bearings, and the stator by the working life of the insulation and the insulation class used. Therefore it is imperative to make preliminary calculations of the operational temperature rise in railroad traction machinery. Particularities associated with the thermal design of a converter-fed asynchronous traction machine are considered. [German]

Feldmann, U *Elektrische Bahnen* Vol. 78 No. 1, Jan. 1980, p 16, 4 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

04 325923

**ELECTRICAL WIRING DIAGRAM FOR THE TEP 60 DIESEL LOCOMOTIVE [Elektrischeschema teplotvoza TEP 60]**

The article shows the changes in the electrical wiring diagram for TEP 60 diesel locomotives since 1971. The second part has the following chapters: electrically controlled compressed air brakes; automatic driver's cab signalling; automatic fire warnings. [Russian]

See also No. 7, 1980 issue, pages 10-16.

Moroskin, BN *Elektricheskaya i Teplovoznaia Tiaga* No. 6, 1980, pp 19-22, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

04 329517

**CAN REGENERATIVE BRAKING BE APPLIED TO A STIRLING ENGINE?**

As applied to electric vehicles, the concept of regenerative braking (i. e., the storage and later use of energy normally dissipated as heat by friction brakes) is well known. A University of Calgary researcher has recently completed a study which indicates that regenerative retarding can also be applied to vehicles powered by Stirling-cycle engines. Changes in the valving arrangement of a multiple-cylinder Stirling powerplant can convert the engine to a heat pump capable of capturing energy which would ordinarily be wasted during a vehicle's downhill travel and storing it in a thermal battery for re-use in the vehicle's propulsion system.

*Automotive Engineering* Vol. 88 No. 7, July 1998, pp 62-65

ACKNOWLEDGMENT: EI  
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DOTL JC

04 329527

**PARAMETERS OF SOLID-ROTOR INDUCTION MACHINES WITH UNBALANCED SUPPLY**

The tubular-axle induction motor (TAIM) with solid rotor when used with single-phase supply and a Ferraris-Arno phase conversion system for rail

traction is considered. A mathematical model is presented for solid-rotor induction machines with unbalanced supply. Measurements are reported of the incremental permeability of steel under conditions where two alternating excitations of differing frequencies are superimposed. These data are used in a proposed method for calculating the negative-sequence impedance of the solid-rotor machine from design data. A new method is described for measuring the parameters of machines with unbalanced supply under actual operating conditions, and is shown to be useful when variations due to magnetic saturation are significant. The theoretical work is verified by tests on large and small machines (150 kw at 500 and 250 w at 1500 rpm). The application of the model in the simulation of traction systems is illustrated.

Chalmers, BJ (Manchester University, Institute of Science & Tech);

Spooner, E Abdel-Hamid, RH *IEE Proceedings Part B* Vol. 127 No. 3, May 1980, pp 174-182, 10 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

04 329530

**WINDING INSULATIONS FOR TRACTION MOTORS OF ELECTRIC TRACTIVE UNITS [Wicklungsisolierungen fuer Fahrmotoren Elektrischer Fahrzeuge]**

Internal operation, types and designs of traction motors determine the structure and dimensioning of winding insulations. Insulation systems with solvent-free impregnation resin and films of high thermal stability have been introduced for some time. Thereby the thermal load capacity of traction motors can be considerably increased. Laboratory and functional tests have been carried out before the introduction of the MICALASTIC insulation system. The operating experience concerning the demand for moisture-proof insulations is excellent. Work is in progress for the purpose of developing insulation systems with a higher thermal load capacity at reasonable costs. [German]

Meyer, H Lienert, W *Elektrische Bahnen* Vol. 78 No. 3, Mar. 1980, p 58, 13 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

04 329937

**THE DEVELOPMENT OF ENERGY/SAVING VEHICLES**

Electrically powered railway transportation systems have a high energy efficiency and are therefore likely to become increasingly important in the future for both freight and passenger traffic. ASEA's development work in the field of locomotives, multiple-unit trains and tramcars is described.

Nordin, T *ASEA Journal* Vol. 53 No. 4-5, 1980, pp 51-58, 13 Fig.

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04 329947

**CALCULATION OF ARMATURE TEMPERATURE RISE VALUES OF TRACTION MOTOR UNDER TRAIN OPERATING CONDITIONS**

Load current for traction motors is up to 1.5 times the rated amperage over a very wide speed range, very severe operating conditions as compared with standard electric motors. Because armature construction of traction motors is complicated, localized heating can produce insulation damage. This study was to produce a method of calculating temperature rise of motors under varying operating conditions for the benefit of motor and rolling stock designers.

Yamazaki, S Kotaki, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 132-137, 11 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

04 329956

**TRACTION MOTORS AND DRIVES FOR A.C. ELECTRIC TRACTION**

The paper reports on the interrelations between the static inverter and the traction motor and between the traction motor and the mechanical drive and



the power transmission at the wheel/rail contact system, respectively. Mention is made both of the static inverter working with an impressed voltage and of the inverter working with an impressed current in the link circuit. [German]

Kratz, G *Glaser's Annalen ZEV* Vol. 104 No. 8-9, Aug. 1980, pp 283-290

ACKNOWLEDGMENT: British Railways

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05 319988

**BSI MAGNETIC TRACK BRAKE**

The first part of the description briefly outlines the economical and significant application criteria and the general advantages of the BSI magnetic track brake. The physical and mechanical relationships and the resulting technical possibilities are explained in detail, with particular reference to the braking effort attainable. The construction of the BSI magnetic track brake is described in detail. Particular attention is drawn to the optimum utilization of the physical possibilities and the high reliability in service. The arrangement of the brake magnets in the vehicle is described with special reference to an elevated suspension system implemented in connection with the installation of a BSI magnetic track brake in an MD 36 bogie of Deutsche Bundesbahn. Special attention is drawn to the constructional details of this solution and to the connection and control problems involved. In conclusion, testing and quality assurance of the BSI magnetic track brake are briefly discussed. [German]

Weiss, U Klein, W *Glaser's Annalen ZEV* Vol. 104 No. 5, May 1980, pp 133-137

ACKNOWLEDGMENT: British Railways  
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05 322008

**IMPORTANCE OF BRAKE TECHNIQUE AND AUTOMATIC COUPLING [Die Bedeutung der Bremstechnik und der Automatischen Kupplung fuer den Modernen Schienenverkehr]**

The first part of the present paper deals with various aspects of the braking of wheel/rail vehicles, which offer chances of further automation: the coefficient of adhesion and its utilization--brakes for trains of higher speeds and/or higher axle loads--brake operation in train sets. The second part of the paper is concerned with the development of the automatic center-buffer coupler and its advantages which have resulted in the decision to introduce the automatic coupler in Europe, even though a date for the introduction has not yet been fixed for lack of the necessary funds. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortr, Hamburg, Germany, June 12-14, 1979.

Kubath, G Schelle, A *ETG-Fachberichte* No. 4, 1979, pp 41-63

ACKNOWLEDGMENT: EI  
ORDER FROM: VDE-Velag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

05 322509

**USE OF MICRO-COMPUTERS ON RAILWAY VEHICLES [Einsatz von Mikrorechnern auf Bahnfahrzeugen]**

For control and regulating installations in train vehicles, BBC has developed a modular micro-computer system. Automatic drive and braking control for locomotives using a micro-computer has been called "Computerised modular regulation of motor vehicles". Another case of micro-computer application is for the regulation of insulation in high-speed electrodynamic lift vehicles. [German]

Eickermann, J *BBC-Nachrichten* Vol. 62 No. 1, 1980, pp 9-17, 11 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Brown, Boveri & Cie, Aktiengesellschaft, Kallstadter Strasse 1, 6800 Mannheim, West Germany

05 322979

**CHARACTERISTICS OF A PNEUMATIC PRESSURE RELAY VALVE**

The lumped parameter approach has been utilized to develop a mathematical model for a pneumatic pressure relay valve for train brake system in order to facilitate theoretical investigation of the static and dynamic characteristics of this valve. The equations of motion exhibit the property known as stiffness. Numerical techniques for the solution of these equations are discussed. Theoretical results show good correlation with experimental results. The mathematical model has been utilized to investigate the effects of parameter variations on output pressure response. It has been found that for stable performance of this relay valve, it is essential that the feedback orifice be properly sized in relation to the input orifice.

Proceedings of the Summer Computer Simulation Conference 1979 SCSC, Toronto, Ontario, July 16-18, 1979.

Cheng, RMH (Concordia University, Canada)  
American Federation of Info Processing Soc Press 1979, pp 240-244, 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Federation of Info Processing Soc Press, 210 Summit Avenue, Montvale, New Jersey, 07645

05 324446

**THREE METHODS OF EMPTY/LOAD BRAKING FOR FREIGHT CARS**

The increasing occurrence of lightweight, high capacity freight cars mandates the use of empty-load brake equipment. Railroad managements are faced with a choice between displacement, valvular and leverage type equipment to perform this important function. This paper describes the operating principles of each method and presents a comparison of their advantages and disadvantages to aid in selecting a unit appropriate for a particular use.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, Chicago, Illinois, November 16-21, 1980.

Beacon, RG Bissell, TJ (Ellcon-National, Incorporated)  
American Society of Mechanical Engineers Conf Paper 80-WA/RT-7, 1980, 7p, 7 Fig., 2 Tab., 6 Ref.

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05 324496

**STATE ESTIMATION IN LONG FREIGHT TRAINS**

Handling of very long multipowered freight trains needs closed loop controllers for throttling and braking that are superposed to a given off-line schedule. The objective of the controller's action is mainly to minimize velocity and coupler force deviations from nominal values due to gravity and other disturbances. Controllers studied for that purpose assume the capability of transmitting information along the train and need to know the actual locomotive and car velocities as well as the coupling forces. As only a small number of these states are actually measured, often the locomotive velocities only, an observer for the estimation of the other states is necessary. Although the observer design is made easier by a linearization of the train model around the nominal values, the high order of the system makes the design of a usual reduced observer awkward and the dimension of the observer will be too high to be of any practical value. The object of this paper is to develop a low order observer that reconstructs the dominant modes of the system. In order to keep the design general, the lumped parameter train model is approximated by a distributed parameter model, that matches the dominant modes sufficiently well. The advantage of such an approach is that analytical expressions are found for the eigenvalues and eigenfunctions of the system, that enable a straightforward representation of the dominant modes. The design of the feedback matrix of the observer is based on a simple structure that needs only the locomotive velocities. The coefficients of the feedback matrix are found by applying a suboptimal design using a quadratic objective function. It is shown that this choice of observer feedback results in a fast reconstruction of the states. Simulation results show the transient behaviour of the designed observer and its performance under various dynamic situations for different train lengths (system orders) and observer orders.

Gruber, P Bayoumi, MM  
Canadian Institute of Guided Ground Transport, Queen's University, Canada, Social Sciences & Humanities Res Council of Canada, (PRO-903-02) CIGGT 79-21, Apr. 1980, 110p, 26 Fig., 14 Ref.

ORDER FROM: CIGGT

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05 324884

**CHOOSING A BRAKING SYSTEM**

The paper makes mention of D.S. Galton's classic work in which he showed the superior braking performance achieved by keeping the wheel revolving, and the varying braking effect of cast iron brake blocks with both time and speed. The fundamental principles limiting the braking system for a variety of duties are examined, and the balance between technical perfection, operational reliability, ease of maintenance and economy is sought. The limits of a friction brake are reached under emergency conditions and the effect of rail adhesion, brake block friction, speed and weight of train and,

above all, the power dissipated per wheel is investigated. The desire for improvements to the environment and the need to conserve energy has brought increased attention to the use of rheostatic or regenerative braking.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Maxwell, WW *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 3-5

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324885

#### THERMAL ASPECTS OF RAILWAY BRAKING

Friction brakes must be designed and dimensioned so that they can dissipate the heat generated during braking and yet avoid excessive temperatures and stresses at the friction interface. In this paper the principles involved and the many factors that influence braking temperatures are considered. Analytical and numerical methods are described that enable temperature distributions in the brake to be determined for both transient and continued braking. The solutions obtained by considering a one-dimensional heat problem have been applied to single stops made from high vehicle speeds and to continued braking down a steep Alpine descent as severe applications of importance to railway brake engineers.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Newcomb, TP (Loughborough University of Technology, England) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 7-18, 36 Ref.

ACKNOWLEDGMENT: EI

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05 324886

#### BRAKES AND WHEEL/RAIL ADHESION

Wheel/rail adhesion levels required by braking are compared with the available adhesion measured by a tribometer train. The probability of wheelslide in the worst of normal conditions is enumerated. The extremes of low adhesion, due to autumn leaves or thick rust, are described. An account is given of the adverse effects of some composition blocks, measured in the laboratory, and evidence supporting the use of auxiliary cast iron or abrasive "scrubber blocks" to maintain adhesion is outlined.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Pritchard, C (British Railways) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 19-26, 19 Ref.

ACKNOWLEDGMENT: EI

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05 324887

#### WHEEL SLIDE PROTECTION

Having investigated the need, and requirements for wheel slide protection, this paper reviews the techniques commonly adopted in present day systems and discusses the important aspects of control, the evaluation of wheel slide protection systems, and how such systems may be improved in the future.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Adamson, J (Lucas-Girling Limited) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 27-35

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324888

#### PRINCIPLES OF BRAKE CONTROL SYSTEM DESIGN

The paper deals with the fundamental principles of modern brake equipment design, using as a theme the generation, transmission, and interpretation of the brake demand signal. The limitations of conventional systems using air as a transmission medium are briefly stated, showing the necessity for the adoption of electrical control to achieve the performance required from a modern brake control system. Electrical brake control systems fall into two

categories, the so called "All Electric" arrangements where the electric demand transmission system provides the only brake communication path down the train, and the combined "Electric-Pneumatic" arrangements where electrical control is superimposed onto an otherwise conventional pneumatically controlled brake system. The paper considers the relative merits and applications of the two concepts, and goes on to discuss the various alternative electrical demand transmission systems in current use.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Smith, GA (Davies & Metcalfe Limited) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 37-46

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324889

#### USE OF THE WEIGHT CONCEPT TO DEFINE THE EFFICIENCY OF A RAILWAY BRAKE

Braking efficiency is defined in different ways by the world's railway authorities operating under rules administered by bodies such as UIC (Union Internationale des Chemins de Fer--Europe), AAR (Association of American Railroads--North America) and also that of the Union of Soviet Socialist Republics. Nevertheless, the end requirement is common to all railway authorities. After examining the many definitions of braking efficiency in use, the paper analyzes the UIC definition based on the brake weight concept and how it was derived.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Heller, G (Hungarian State Railways) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 53-57

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324890

#### EFFECT OF PHOSPHORUS IN CAST IRON BRAKE BLOCKS

The effects of phosphorus on the friction, wear and sparking characteristics of cast iron brake blocks have been studied on a full-scale dynamometer. Three inertial loads were investigated which typified a coach, multiple unit and locomotive. Eight different phosphorus contents were tested between 0.05% and 7%. High phosphorus levels were usually found to increase the coefficient of friction and decrease the wear rate and spark emission. Mechanisms of braking and wear are explained qualitatively in terms of hot spot formation and heat re-distribution through the melting of iron phosphide. Some aspects of service experience with high phosphorus blocks are described with reference to cracking, insert design and the economics of service life improvements.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Inckle, AE (British Railways); Beamond, TW *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 65-80

ACKNOWLEDGMENT: EI

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05 324891

#### TREAD BRAKE ACTUATION SYSTEMS

The insufficiency of mechanical links to distribute brake actuation energy has led to the development of the tread brake actuator, a modular system comprising generation of required shoe force, a shoe holder with its reaction link, a slack adjuster maintaining correct shoe clearance irrespective of wheel and shoe wear and a suitable parking brake actuator. Modern bogie and wheel axle designs for higher speeds, better curving performance and more installed tractive power put a variety of demands on the tread brake mounting arrangement. A majority of the tread brake actuator systems are air operated with mechanical force amplification mechanisms but also air over hydraulic or straight hydraulic systems have been developed.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Ekdahl, EK *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 81-94



ACKNOWLEDGMENT: EI

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05 324892

#### THERMAL DAMAGE TO RAILWAY WHEELS

This article is a survey of the different wheel defects which are induced by the heat generated during braking. It emphasizes the mechanisms of the phenomena and the character of the damage.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Swaaij, JL van *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 95-100, 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324893

#### SEARCH FOR IMPROVED WHEEL MATERIALS

The phenomenon of tread damage as a result of the application of a tread brake has been known for many years and several attempts have been made to develop materials which will resist this damage. In terms of improvements in service performance the traditional methods of simulation dynamometer testing has proved to be unsuccessful. This paper outlines an alternative approach which is based on an understanding of the local fatigue environment in which the tread surface exists. For this approach to be applied successfully certain information must be input concerning the local environment, the relevant mechanical properties and the relationships between them. In this case, the critical location has been taken to be a hot spot. Methods of measuring hot spot temperatures are being developed. However, to identify strains and internal temperatures it is necessary to produce a mathematical model of the hot spot.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Hewitt, G (British Railways Board); Musiol, C *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 101-110, 34 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324894

#### THERMAL PROPERTY MEASUREMENTS IN BRAKE SHOE MATERIALS

As part of a program to numerically calculate the heat flow between brake shoes and wheels, the thermal diffusivity, specific heat, and thermal conductivity of five cast iron and three composition brake shoe materials were determined. A pulsed laser technique was used for thermal diffusivity measurements, and the specific heat was determined by a differential scanning calorimeter.

International Conference on Railway Braking, University of York, England, September 22-27, 1979.

Lagedrost, JF (Energy Materials Test Laboratory); Eldridge, EA Stone, DH *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 111-114

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324895

#### METALLURGICAL STUDY OF THE FACTORS AFFECTING THERMAL FATIGUE CRACKING IN RAILWAY WHEEL AND TYRE STEELS

The British Steel Corporation has employed a simulation involving alternate heating and quenching of the rim of a rotating disc, to study the nucleation and growth of thermal fatigue cracks in steels for railway wheel and tyre applications. At a maximum temperature of 500 degree C the high temperature strength of alloy steels was found to prevent plastic deformation during cycling and thermal fatigue damage was minimal compared with carbon steels which underwent plastic deformation. At 650-700 degree C the alloy steels showed thermal fatigue cracking and the best resistance to damage was found in low strength carbon steels. At 750 degree C the alloy steels formed martensite during the quench cycle and their thermal fatigue

damage increased relative to carbon steels. In alloy steels the amount of thermal fatigue damage was largely controlled by the hardenability. Results indicate that low strength carbon steels represent the best type currently available for thermal fatigue resistance over a wide range of temperatures.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Coleman, TH (British Steel Corporation); Naylor, DJ *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 115-124, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324896

#### CHOICE OF MATERIALS IN FRICTION BRAKING

Technical, environmental, and other factors controlling the selection of materials for friction braking are considered, together with developments in acceptance testing and quality control. Current and possible future friction pairs are discussed.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Waldron, GWJ (British Railways) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 125-135, 26 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, New York, New York, 10017

05 324897

#### DESIGN OF COMPOSITE FRICTION MATERIALS FOR RAILWAY BRAKES

Friction materials for railway brakes are complex mixtures of fillers and other components in a polymer matrix. As a wide range of polymers and fillers can be used, materials can be designed to meet specific applications. The material, however, not only has to have the specified coefficient of friction ( $\mu$ ) and wear properties for the particular application, but it also has to meet a number of other requirements, for example, it must not cause thermal damage of the opposing surface, or wear the latter unduly, or induce brake squeal. It can be more of a problem meeting those requirements than in obtaining the required  $\mu$  and wear levels. Consequently friction materials, after the initial design stage, are generally subjected to considerable development, and are tested and modified and tested again until the material is satisfactory in all respects.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Walsh, P Spurr, RT *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 137-142

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324898

#### PRINCIPLES OF BRAKE CONTROL SYSTEM DESIGN

The paper describes the development of a method of predicting brake block wear and gives the results of a first attempt to establish its reliability by comparing the predicted wear with that which actually occurs in an existing service. A new approach to laboratory-scale wear testing has enabled the wear per unit energy dissipated of a given composition material to be determined for any relevant combination of the three basic parameters--tire surface temperature, rubbing speed and applied force. The values of energy dissipation, rubbing speed and brake force at any instant during a given service are calculated from a knowledge of the relevant vehicle parameters and from direct observation or calculation of the braking duties undertaken. The surface temperatures are calculated from these data using one-dimensional heat flow equations which are improvements on those developed previously. A computer program has been developed which calculates these temperatures and uses laboratory wear data to work out the predicted wear for the service being studied.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

McGuire, M (British Railways) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 143-151, 19 Ref.



ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324899

#### ENVIRONMENTAL CONSIDERATIONS IN THE SELECTION OF FRICTION MATERIALS FOR RAIL APPLICATIONS

There are considered to be three generations of friction materials all in current use--cast iron, asbestos based composition materials and "non toxic" composition materials. The paper identifies the various constituents of these materials and reviews the evidence of their impact on the environment. The conclusion is drawn that much of the recent concern about health hazards is misdirected. It is put forward that the current main environmental problems with rail friction materials arise from the failure of railways to move away from the first generation cast iron on other than a small scale.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Weaving, B (Trist Draper Limited) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 159-166, 49 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324900

#### RAIL VEHICLE DISC BRAKE--PRINCIPLE AND PRACTICE

Details of some of the limitations of wheel tread brakes, and the consequent case for adoption of disc brakes, are followed by a description of the basic disc brake scheme. Current designs of disc, pad, and brake gear are discussed, an example of a British Rail application is given, and the paper concludes with notes on standardization and future possibilities.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Tickle, CJF *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 167-181, 15 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324901

#### DISC BRAKES FOR MASS TRANSIT

In mass transit operations like streetcar-, underground-and metro-operations the braking performance is of utmost importance. Depending on the type of service and type of brake system the requirements on the disc brake as service brake and emergency brake may be very high. The thermal and mechanical performance of the disc is, however, influenced by the choice of disc material, the effectiveness of the cooling and design. This paper discusses the requirements of the mass transit operations, the performance limits of disc brakes and the factors influencing these performance limits. The results are founded on extensive laboratory and service tests and computer analysis, which are reported.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Cavell, BG Saumweber, CE Berndt, P Gerich, R *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 195-205

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324902

#### COPPER DISC BRAKES ON THE ADVANCED CONCEPT TRAIN I

The friction brake system components described in the paper were developed on behalf of the United States Department of Transportation for the Advanced Concept Train I (ACT I), a 220-passenger rapid transit rail vehicle. The choice of chrome copper as disc material and disc-associated friction lining was made to meet severe friction-brakes-only operating mode and utilizes the high friction coefficient and diffusivity of chrome copper. Results from dynamometer tests and from a limited program of rail trials corresponded well with predictions contained in the thermal analysis. Braking rates were maintained and occasionally exceeded during simulated round trip tests at disc surface temperatures to 850 K.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Chary, HH (AiResearch Manufacturing Company); Miner, DK Yang, MS *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 207-215

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324903

#### APPLICATION OF HYDRODYNAMIC BRAKES TO RAILWAY VEHICLES

Diesel locomotives and multiple units fitted with hydromechanical transmission systems have sometimes featured hydrodynamic braking which, sharing a common technology, often forms a logical part of such a transmission scheme where it can adopt the role of an auxiliary brake. More recently, the successful development of the first full duty axle borne hydrodynamic brake has been undertaken. This was required to satisfy the high energy capacity and peak power ratings demanded by increasing running speeds, and also producing a sufficiently low unsprung mass to comply with civil engineering criteria for track forces. A transmission mounted variant for powered axles has subsequently been developed. The paper reviews the operating principles of the hydrodynamic brake, torque-speed characteristics, control philosophy including auxiliary brakes and performance. It outlines the equipment fitted to the Advanced Passenger Train, describes the development program undertaken and presents details of brake performance.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

*Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 217-227, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324904

#### MULTIPLATE BRAKES: A CHOICE FOR RAILWAY VEHICLE DESIGNERS?

For future railway vehicles the design engineer has currently very little choice in the foundation brakes available. The choice between tread brakes and disc brakes is made largely on the grounds of capacity to achieve specified duties. Design evaluation together with laboratory and track tests indicate that the multiplate brake offers an opportunity to brake railway vehicles economically over the spectrum from high speed freight vehicles through to the fastest passenger trains. Major advantages of low mass and small size should ease design problems in the tightly constrained area around the wheelset and vehicle underbody.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Burt, HGP (British Railways); Fitzgerald, L *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 253-261

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324905

#### SPECIFICATION AND DESIGN OF BRAKING SYSTEMS

The paper defines the factors influencing decisions in specifying and designing braking systems. It discusses experience gained from existing systems, including an analysis of these systems; various factors related to the local environment and conditions; and various aspects of detailed component design. Two examples are described: a "green field" design; and a design for general purpose use in an established railway system of varied nature, with allowance for future change.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Anscombe, RL *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 263-276

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England



05 324906

**BRAKING SYSTEMS FOR RAPID TRANSIT VEHICLES--WITH PARTICULAR REFERENCE TO LONDON TRANSPORT PRACTICE**

The paper outlines the distinctive braking requirements of rapid transit vehicles, following which the various elements of a complete braking system are examined and recent trends described. The interaction with other developments, such as Automatic Train Operation, is discussed and examples of modern systems are described.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Ware, DK (London Transport) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 277-281

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324907

**RAILWAY FREIGHT TRAIN BRAKING--NORTH AMERICAN STYLE**

The North American railroad operating environment and typical freight train types, speeds and operating characteristics are described. Differences in North American and European train stopping ability and braking requirements are outlined. The performance of the AAR brake system is explained in detail. Typical freight train braking operations are reviewed with wheel temperature data provided.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Jones, HH (Union Pacific Railroad); Blaine, DG (Westinghouse Air Brake Company) *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 283-297

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 324908

**BRAKING OF HIGH SPEED PASSENGER TRAINS**

Passenger trains operating at maximum speeds of between 200 and 300 km/h must be equipped with brake gear that is highly efficient, operates reliably and is not too complex. Dynamic brakes are primarily suited for motor vehicles, while trailer stock is predominantly fitted with disc brakes. The use of additional adhesion-independent braking systems is recommended to ensure that prescribed braking distances are maintained even in very adverse weather conditions, and to facilitate rapid stopping in case of danger. Sophisticated anti-skid protection devices are invaluable aids for safe braking when adhesion is low. For practical purposes, high-speed passenger trains are equipped with an automatic air brake. Electromagnetic control of the air brake can improve the braking characteristics still further.

International Conference on Railway Braking, University of York, England, September 26-27, 1979.

Braun, A *Institution of Mechanical Engineers Conference Pub Conf Paper* 1979-11, 1979, pp 309-319

ACKNOWLEDGMENT: EI

ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England

05 325719

**EVALUATION OF THE COSTS AND BENEFITS OF ADVANCED BRAKING AND COUPLING SYSTEMS**

This report presents an evaluation of the costs and benefits of sixteen advanced railroad braking and coupling systems. Most of the benefits result from improved classification yard efficiencies, with secondary benefits accruing through reduced accident rates, road delays, and maintenance related to component wear and failure. The most promising systems are couplers with wide gathering ranges, a brake condition monitoring system, and a remote controlled brake locking system. In addition, ultrasonic brake control on cars presently requiring special handling and direct electronic brake control all show promise of improving railroad productivity.

Bender, EK Wittig, LE Wright, HA

Bolt, Beranek and Newman, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-80/49, BBN 4417, Oct. 1980, 68p, 53 Fig., 10 Tab., 30 Ref.

Contract DOT-FR-8091

ORDER FROM: NTIS

PB81-123556, DOTL NTIS, DOTL RP

05 325731

**AMTRAK/KNORR DISC BRAKE STUDY VOLUME I-FINAL REPORT**

This report describes the Amtrak/Knorr Disc Brake Study which was developed: (1) To evaluate candidate replacement disc brakes for the Knorr disc brakes presently in use on Amfleet and Turboliner cars. (2) To explain the cause of the loosening of the attaching pins and the excessive wear experienced by the disc-brake friction ring on the Knorr disc brakes. (3) To find out why the disc brake failure rate was much higher when the outside temperature was below 32 degrees Fahrenheit. This report covers the first six months of a three-year controlled revenue service test, an over-the-road test, and laboratory tests to correlate over-the-road test results to pin wear.

Scofield, R Avant, R

ENSCO, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-80/62.1, DOT-FR-80-12, Sept. 1980, 205p, Figs., 9 Tab.

Contract DOT-FR-64113

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PB81-109837, DOTL NTIS, DOTL RP

05 325732

**AMTRAK/KNORR DISC BRAKE STUDY VOLUME II-APPENDICES A THROUGH I**

This volume contains the following appendices to Volume I, Final Report Appendix A-Wheel Condition Effects; Appendix B-Effects of Cyclic Loads on Pin Wear; Appendix C-Over-the-Road Test Acceleration Data from the Boston Run; Appendix D-Over-the-Road Test Acceleration Data from the Montreal Run; Appendix E-Laboratory Test-Lateral Dynamic Load Test (Pendulum/Bong Test); Appendix F-Vertical Impulse Loading-Laboratory Test; Appendix G-Static Load Test; Appendix H-Temperature, Precipitation, and Snow-on-the-Ground Plots; and Appendix I-Test Plan.

Scofield, R Avant, R

ENSCO, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-80/62.2, DOT-FR-80-12, Sept. 1980, 239p, Figs., Tabs., 9 App.

Contract DOT-FR-64113

ORDER FROM: NTIS

PB81-109845, DOTL NTIS, DOTL RP

05 329541

**AIR BRAKE OF THE ELECTRIC LOCOMOTIVE TYPE 120 FOR THE WEST GERMAN RAILROAD SYSTEM [Die Druckluftbremse der Elektrischen Lokomotive Baureihe 120 fuer die Deutsche Bundesbahn]**

An air brake is described which, in several aspects, differs from previous versions. Innovations include single wheel brakes provided with brake cylinders which are fitted with automatic slack adjusters and spring loaded brake cylinders for the parking brake. A further innovation consists of the use of brake modules. [German]

Junckind, E *Elektrische Bahnen* Vol. 78 No. 3, Mar. 1980, pp 67-70

ACKNOWLEDGMENT: EI

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06 053383

## MEASUREMENT OF INTERFERENCE IN RAILWAY SUB-STATION FILTER INSTALLATIONS AND TRACK CIRCUITS CAUSED BY TRACTION VEHICLES WITH CHOPPERS

The measurements on the CSD railway test circuit were made for the following purpose: 1) to check the impedances of overhead line and sub-station at which the traction vehicle chopper works, 2) to identify the influence of the railway sub-station filter on the interference currents measured at the sub-station, and 3) to identify the degree of risk for the track circuit, when the working frequencies of the chopper and track circuit are identical.

Restrictions on the use of this document are contained in the explanatory material. Prepared by the ORE Specialists Committee A 122 "Application of Thyristors on the railways".

International Union of Railways DT 64 (A 122)E, Sept. 1978, 22p, 11 Fig., 11 Tab.

ORDER FROM: UIC

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06 319930

## COMMUNICATIONS AND COMPUTERS: THE TOOLS ARE GETTING SHARPER

Railroad application of electronics in the form of communications and computers is expanding rapidly. While much of the new technology is a general advance of state-of-the-art, railroads have quickly applied it to their telecommunications, signaling and management information systems. The status of train radio, telephone switching, microwave, data transmission, fiber optics, computer applications, intercomputer data exchange, automatic car identification, computer-assisted dispatching and AAR Train II discussed. Railroads are successfully utilizing both the centralized and distributed data processing techniques, matching them with appropriate telecommunications systems.

Armstrong, JH *Railway Age* Vol. 181 No. 15, Aug. 1980, p 16, 5 Phot.

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DOTL JC

06 319943

## DB EXPANDS THE LIMITS OF TRACK CAPACITY

Railway traffic has increased in the Federal Republic of Germany to the extent that the DB is having to double certain lines, adapt the signalling system and a number of structures, and to develop a new approach to track maintenance.

Blind, W *International Railway Journal* Vol. 20 No. 3, Mar. 1980, p 24, 2 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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06 319949

## THE RAILWAY IS EXPERIMENTING WITH OPTICAL FIBRE CONDUCTORS [Bahn experimentiert mit Glasfaserlichtleitern]

Since 1979, the DB has been testing its first optical fibre transmission line, measuring 3 km in length, in the Stuttgart station area. Video signals are transmitted from the computer system of a control centre to a colour monitor. The glass fibre cable is laid alongside the track. Its external diameter is 10 mm, and it consists of 12 glass fibres covered with synthetic material. Transmission losses remain less than 5 dB/km. The DB intends to use optical electronics later for control systems for motive units and reversible trainsets among other applications. [German]

*Elektrotechnische Zeitschrift, Ausgabe A* Vol. 101 No. 3, 1980, 170p.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

06 319950

## THE MICROCOMPUTER USED IN THE MARSHALLING YARD [Mikrocomputer in der Rangiertechnik]

The use of microcomputers in medium-sized marshalling yards has made it possible to decentralise control of them to a large extent. The MICOR marshalling yard control system resolves the problems that arise; installa-

tions designed according to this system are easy to supervise, reliable and easily handled. The outstanding features of MICOR are its modular structure, its high rate of availability, its short repair times, great braking precision, and its consequent high level of productivity in marshalling. [German]

Hoerder, A *Signal und Draht* Vol. 72 No. 3, 1980, pp 55-61, 6 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 319961

## INSTALLING CABLE TUBES BY PRESSURE UNDER A BUSY STATION [Bau einer Pressrohrkabeltrasse unter einem stark belasteten Bahnhof]

In Frankfurt South station which handles a large volume of traffic, two conduits for cables were installed by pressure as part of the modernization scheme for signaling installations. The author describes the planning stages and the experience gained in carrying out the work. [German]

Goette, KA *Eisenbahningenieur* Vol. 31 No. 4, Apr. 1980, pp 145-150, 13 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 319976

## ABOUT THE CONTRIBUTION OF MICROELECTRONICS TO THE DEVELOPMENT OF RAILWAY SAFETY ENGINEERING

In this article are presented the reasons for application of the microelectronics in railway safety engineering and the problems, which must be solved, are dealt with. It must be in mind, that in this case there is not only given a simple change of generations of the used techniques but there are also to solve fundamental problems. The advantages of the microelectronics and especially of the microcomputation require its broad application. In relation to the techniques of the new generation it is necessary to widen the theory of safety. [German]

Apel, W Fenner, W *DET Eisenbahntechnik* Vol. 28 No. 5, May 1980, pp 196-197

ACKNOWLEDGMENT: British Railways

ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

06 319986

## MONITORING TRAIN MOVEMENTS

So that trains can be run in a satisfactory manner, it is necessary to have at various operating levels information that must be all the more adequate, accurate and quickly available as the number and speed of trains increase. The relatively new tool that can meet these requirements is known as the train movement monitoring system. The systems installed in Versailles-Chantiers box and on Paris-North suburban lines have been described in previous articles. This article synthesizes the definition, the purpose and the general principles of monitoring train movements. It will be followed by other articles describing the systems installed on Paris-East and Paris-North suburban lines as well as on the Left Bank link between Paris-Austerlitz and Versailles-Chantiers. [French]

Audouin, J *Revue Generale des Chemins de Fer* Vol. 99 May 1980, pp 281-290

ACKNOWLEDGMENT: British Railways

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DOTL JC

06 322010

## OPERATIONS CONTROL TECHNIQUES IN RAIL TRAFFIC [Betriebssteuertechnik im Schienenverkehr]

On the basis of the existing signalling techniques (both block and signal boxes) as well as the present remote control of the trains of the German Federal Railway, the methods and targets are shown leading from process computer control of the integrated system of linear train control with cab signalling for speeds of 200 km which is operated with full responsibility for the safety since May 1978, to operations control techniques in microelectronics. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany,

June 12-14, 1979.

Wehner, L *ETG-Fachberichte* No. 4, 1979, pp 14-30

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

06 322014

#### GRID CONTROL STATIONS FOR SUPPLYING ELECTRIC RAILROADS [Netzleitstellen fuer die Versorgung Elektrischer Bahnen]

Based on the different functions which grid control stations have to fulfill in the supply of electric railways within the DB-network, their technical development is explained. The supply of information through modern dispatching stations and with the aid of colored display units operated via data processing installations is described by means of illustrations which were prepared for the different components of the installation the control of which is effected by alphanumeric keyboards and special function keys. Finally, the special tasks as well as the displays necessary for these tasks are briefly touched upon for the only central net control station of DB at Frankfurt (M). [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortr, Hamburg, Germany, June 12-14, 1979.

Seiffert, K *ETG-Fachberichte* No. 4, 1979, pp 31-39

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

06 322023

#### QUANTITATIVE TECHNIQUES FOR MOBILE RADIO SURVEYING

British Rail has established a range of radio surveying facilities to assist in the design and commissioning of both a wide area mobile radio network and specialized track to train radio systems. A quantitative practical approach has been employed. Temporary fixed stations are established in the field and a data logging system is used on either a road or rail vehicle to record field strength variations as the vehicle proceeds along a planned route. Subsequent analysis and combination with geographic data allows the production of field strength maps and graphs as well as tabular survey results.

Proceedings of the Conference on Land Mobile Radio, University of Lancaster, Bailrigg, England, September 4-6, 1979.

King, CR (British Railways Board); Cree, DJ *IERE Conference Proceedings* No. 44, 1979, pp 257-271, 1 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electronic and Radio Engineers, 9 Bedford Square, London WC2B 3RG, England

06 322024

#### LEAKY FEEDER RADIO TECHNIQUES FOR MINES AND TUNNELS

Leaky feeder systems should include frequently spaced in-line repeaters for consistent performance and to minimize line and mobile transmitter powers. In the well-established "daisy chain" arrangement of a parallel telephone line is now obviated by a return path through the repeaters at audio or medium radio frequency. The BDR (bi-directional routing) system is also in very successful operational service and an improved version is under trial. Such systems lend themselves to unique diversity arrangements for overcoming multipath effects in tunnels. The use of repeaters rather than multiple base stations is particularly economic in multi-channel operation.

IERE Conference Proceedings Supplement to No. 44, Proceedings of the Conference on Land Mobile Radio, University of Lancaster, Bailrigg, England, September 4-6, 1979.

Martin, DJR Haining, RW *IERE Conference Proceedings* No. 44, 1979, pp 305-317, 17 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electronic and Radio Engineers, 9 Bedford Square, London WC2B 3RG, England

06 322028

#### IMPROVED ANTENNA OF RADAR SPEEDOMETER FOR YARD AUTOMATIC CONTROL

This paper explains the reason why the present antenna may detect the speed of the running cars on the next tracks, and describes the design of the

antenna which has such directivity that it may not be influenced from the next tracks.

Hattori, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 4, Dec. 1979, pp 153-156

ACKNOWLEDGMENT: EI

ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

06 322508

#### THE VZT RAILWAY RADIO MEASUREMENT CAR [Voiture ferroviaire de mesure radio VZT]

This car is used by the SNCF to record the radio-electric field measured along the track, with a view to determining the optimum location of fixed radio stations. Transmissions are made from provisional stations for these recordings, which track-train radio system already in service. The article describes the technical arrangements in this car, and mentions the processing of the data collected and the special method for prospecting lines to be equipped with a radio system. [French]

Collard, P *SNCF-Informations Techn-Direction de l'Equipeement* No. 19, Nov. 1979, pp 67-75, 1 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France

06 322511

#### RADIO TRANSMISSION FOR CONTINUOUS CONTROL OF TRAIN RUNNING--LZB [Funkuebertragung fuer die Linienzugbeeinflussung]

A new microcomputer-based device has been developed as on-board equipment for continuous train control whereby signals for train control are sent using microwave transmission techniques. The new equipment has been designed to improve performance and reliability of the train control system insofar as possible. [German]

Fischer, R Riedisser, F *Signal und Draht* Vol. 72 No. 5, May 1980, pp 87-92, 5 Fig., 3 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 322512

#### DUS 800. A SAFE REMOTE CONTROL MICROCOMPUTER SYSTEM FOR SIGNALLING INSTALLATIONS [DUS 800. ein signaltechnisch sicheres Mikrocomputer-Fernwirkssystem]

The DUS 800 remote control system is used for railway signalling installations and meets the German Federal Railway's requirements, especially as regards fail-safe signalling equipment. Instructions and announcements are checked by a reliable microcomputer system called SIMIS R and telecommunications have protection against transmission errors. Depending on the capacity of transmission lines, a maximum of 4096 bits of data can be transmitted by 8 channels. The DB will place a pilot installation in service in the middle of 1980. [German]

Guenther, R Krug, A *Signal und Draht* Vol. 27 No. 4, Apr. 1980, pp 74-80, 7 Fig., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 322527

#### INSTALLATIONS FOR AN UNINTERRUPTED CURRENT SUPPLY FOR RAILWAY SIGNALLING [Anlagen zur unterbrechungsfreien stromversorgung fuer die Eisenbahnsignaltechnik]

The installations (USV) are indispensable for the railways because of the need for continuous availability and reliability, and the possibility of blackouts in the public supply network. Energy accumulators in the d.c. current circuit are essential for an uninterrupted supply of electricity. The rotary USV installations also possess a kinetic energy accumulator. Different types of this equipment and examples of models constructed are discussed. [German]

Heukelum, KD van *Verkehr und Technik* Vol. 33 No. 4, Apr. 1980, pp 130-136, 7 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schmidt (Erich) Verlag, Herforder Strasse 10, 4800 Bielefeld, West Germany

06 322562

**OPERATIONAL TECHNOLOGY IN PUBLIC RAIL-BOUND TRANSPORT** [Betriebsleittechnik im Schienengebundenen Nahverkehr]  
Operational technology as part of safety and railway automation process plays an important role in public transport. First, the area of management operation technology is divided from the areas of signalling technology and train control technology. The basis of the structure of an urban railway network, the role of the three functional planes "areas", "line" and "control centre" are laid down. For the carrying out of these roles, a hierarchical system is proposed for the computer and is explained by means of an example of an actual system in use. [German]

Sperl, H *Internationales Verkehrswesen* Vol. 31 No. 3, May 1979, pp 172-175, 6 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 311462), Federal Institute of Road Research, West Germany  
ORDER FROM: Federal Institute of Road Research, West Germany, Bruhl-erstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

06 322576

**35 GHZ COMMUNICATION LINK FOR RAILWAY APPLICATIONS**

A 35 GHz line-of-sight transmission link for communication between traffic control center and all trains on the line has been investigated. Secure transmission for distances ranging from 500 to 2000 m has been achieved. The equipment and test results are briefly described.

Conference Proceedings of the European Microwave Conference 9th, Brighton, England, September 17-20, 1979.

Meinel, H Plattner, A Breitschaedel, R  
Microwave Exhibition and Publications Limited 1979, pp 259-262

ACKNOWLEDGMENT: EI  
ORDER FROM: Microwave Exhibition and Publications Limited, Sevenoaks, Kent, England

06 322578

**MICROPROCESSOR CONTROL OF REMOTE LOCOMOTIVES**

A microprocessor-based system has been developed for the remote control of sugar cane locomotives. The system is used to control an unmanned locomotive near the rear of the train from a manned unit at the head of the train. The development work consisted mainly of correctly interpreting the ill-defined functional and environmental requirements, and then effectively applying existing microprocessor technology to produce the satisfactory working system described here.

National Conference Publication of the Institution of Engineers, Australia, No. 79/12, Conference on Microprocessing Systems, Preprints of Papers, Melbourne, Australia, November 27-28, 1979.

Reichard, SR (Sugar Research Institute); Burns, AC  
Institution of Engineers, Australia 1979, pp 73-76, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Institution of Engineers, Australia, 11 National Circuit, Barton, A.C.T. 2600, Australia

06 322645

**SIMULATION STUDIES OF AN ELECTRICAL INTERFERENCE PROBLEM AFFECTING MASS TRANSIT CIVIL ENGINEERING DESIGN**

Part I of the Paper gives a brief description of an automatic train protection (ATP) system for a mass transit railway, and indicates some problems that may arise because of inductive interference caused by the presence of reinforcing steel in the structures supporting the track. Part II deals with two months of study capable of yielding quantitative estimates of the interference effects in a reliable and systematic manner. In the first method a full-scale simulated track system was built and, based on suitable instrumentation, the physical parameters as well as the relationships governing the inductive interference were determined. The second method relies on establishing a mathematical model that invokes basic electromagnetic field theory and transmission line theory to arrive at a generalised solution. The results obtained with both methods are presented and compared.

See also Vol. 8 No. 8 August 1980 issue pages 35-41.

Chan, FHY Edgley, RK Lam, FK Tso, SK *Hong Kong Engineer*  
Vol. 8 No. 7, July 1980, pp 39-41, 4 Fig., 2 Ref.

ORDER FROM: Asia Trade Journals Limited, 7th Floor, Sincere Insurance Building, 4-6 Hennessy Road, Hong Kong, Hong Kong

06 322788

**TOTAL COMMUNICATIONS EXCHANGES**

Microprocessor technology has been developed to tie telephones, talkback speakers and radio into a coordinated communications package for classification yards or for mainline dispatching. The Safetran TCX (Total Communication Exchange), based on PABX telephone switching principles; provides a previously impractical coordination of the various communications paths, including organizational and informational assistance, conferencing and communications management. Initial application of TCX has been made in Chessie System's Queensgate Yard in Cincinnati.

*Progressive Railroading* Vol. 23 No. 8, Aug. 1980, p 62, 5 Phot.

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

DOTL JC

06 322837

**SAFETY OF RELIABILITY MUST WE CHOOSE?**

The transit industry has traditionally depended upon fail-safe design techniques and practices to achieve safety in the application of its control and communications systems. The ability to produce a reliable design using these techniques is somewhat limited, particularly as the level of automation increases. The aerospace industry has provided safety in the systems they have developed through disciplined programs of hazard analysis and risk assessment, combined with design techniques which enhance the reliability of the systems. It would appear that an amalgamation of some of these techniques and practices into the transit design processes holds some promise of helping to provide reliable automated ground transportation while maintaining the safety of the riding public at an acceptably high level.

Proceedings of the Soc and Aerospace Technology Workshop, Los Angeles, California, November 15, 1979.

Needels, FR (Community Redevelopment Agency) *AIAA Monographs*  
Vol. 25 1979, pp 19-23

ACKNOWLEDGMENT: EI

ORDER FROM: Western Periodicals Company, 13000 Raymer Street, North Hollywood, California, 91605

06 322918

**PARIS-EST TRAIN MOVEMENT MONITORING SYSTEM [Le suivi des trains de Paris-Est]**

This train monitoring system covers the inner suburban area, and enables train movements to be identified and located in real time in an area with intense traffic, where any disturbance in operation causes considerable inconvenience to the public. After describing the general arrangements of the system, its operation is studied in detail. [French]

Roublot, J *Revue Generale des Chemins de Fer* July 1980, pp 427-436, 12 Phot.

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

DOTL JC

06 322925

**THE REDUNDANCY SAFETY SYSTEM [Seguridad por redundancia]**

The author studies the redundancy safety system and how it could be applied to railway signalling. The probability of failure is also examined. [Spanish]

Norton, D *AIT-Revista* No. 33, Mar. 1980, pp 27-35

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

06 322930

**NEW METHODS OF RETARDER CONTROL [Neue Wege zur Steuerung von Gleisbremsen]**

A new design for secondary retarder control to meet the demand for greater precision in controlling the speed of the vehicle. The process is controlled by a control and regulation algorithm. An essential feature of the algorithm is the fact that all statistical and dynamic data relating to the movement of



the vehicle are measured and processed in order to define the necessary and permitted braking force. [German]

Krouzilek, R. Lehmann, S. *Eisenbahntechnische Rundschau* Vol. 29 No. 1-2, Jan. 1980, pp 75-81, 5 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

06 324438

#### MICOL, MICROCOMPUTERS IN OPERATION CONTROL CENTERS

Automatic operations control system of urban rapid-transit systems is described by taking an example of an underground railway using microcomputers for decentralized data processing. The task complex is divided into an information processing section with safe signaling characteristics, and a processing section without safety functions. The safety side of the system is implemented by a network of fail-safe microcomputer while the non-safety-oriented work is accomplished by process-control computers suitable for handling large volumes of process-control data. Each microcomputer is allocated a certain share of the tasks. This modular arrangement, while increasing the hardware outlay, restricts any failure to just one part of the control center's functions.

Forstreuter, H. *Siemens Power Engineering* Vol. 1 No. 2, Feb. 1979, pp 47-50, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 324500

#### CONTINUITY OF ENERGY SUPPLY OF ELECTRONIC COMPUTERS FOR TRAFFIC CONTROL

The solution of the problem of continuity of feed of the equipment is fundamental to guarantee the reliability of a railway traffic control plant. In the case of an operational centre using electronic computers in real time, there can be admitted feed discontinuities only of around some thousandths of a second, and thus so-called "absolute continuity" systems have to be used. The Author makes a comparison between the different techniques of of these systems, indicating the necessary evaluations and the criteria of choice in order to establish, in the various cases, the characteristics and the configuration of the continuity generating set which can be adopted. With reference to a traffic control centre of a junction, mention is also made of experiments carried out with the aim of checking the performance of a static set of the latest "generations". [Italian]

Debarbieri, P. *Ingegneria Ferroviaria* Vol. 35 No. 6, June 1980, pp 533-545

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

06 324914

#### THE SIXTEENTH SYMPOSIUM ON THE USE OF CYBERNETICS ON THE RAILWAY

The introduction of cybernetic concepts and methods is now considered important for optimizing operation and improving management. Since the first International Cybernetics Symposium held in 1963 by the UIC, the Japanese Railway Cybernetics Association (JRCA) organises a symposium every year. 44 papers were presented at the 1978 meeting, and dealt with the different systems in connection with 1) projects, methods of evaluation and examples of methods of transport, 2) information for passengers, 3) ticket issuing and ticket inspection, 4) use, maintenance and safety of rolling stock, 5) the man-machine interface, 6) new transport systems. The document contains a summary of the papers.

Japan Railway Cybernetics Association UIC Cat: 907 0 1, 1980, 67p, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Japan Railway Cybernetics Association, Tokyo, Japan

06 324927

#### FREE-FLOW TRAFFIC SYSTEM; THEORETICAL ASSESSMENT OF ITS VALUE [La fluidification des circulations ferroviaires; essai theorique de quantification de son interet]

During the last ten years, various systems of free-flow train running have been experimented with, and some have been tested in operation. The

free-flow concept consists of regulating the speed of trains in advance so that they do not have to stop at a signal due to change in a very short time. The writers show the advantage of the system especially in certain cases. [French]  
Lancien, D. Calvez, JP. *Revue Generale des Chemins de Fer* Sept. 1980, pp 467-476, 5 Phot.

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

DOTL JC

06 324930

#### SECOND STAGE OF MODERNIZATION OF HOT-BOX DETECTORS ON THE GERMAN FEDERAL RAILWAY [Die Heisslaueforortungsanlagen der 2. Ausbaustufe im Netz der Deutschen Bundesbahn]

No Abstract. [German]

Kollmannsberger, F. *Signal und Draht* Vol. 72 No. 6, June 1980, pp 103-111, 8 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 324936

#### OPERATING EXPERIENCE WITH FLY SHUNTING IN MANNHEIM MARSHALLING YARD [Betriebserfahrungen mit der Laufzielbremsung im Rangierbahnhof Mannheim]

In the experimental installation in Mannheim marshalling yard, tests are being conducted on rail brake operation and fly shunting controlled by microprocessors. [German]

Hohmann, H. Meuters, G. *Rangiertechnik und Gleisanschlusstechnik* No. 39, 1979, pp 33-37, 2 Tab., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

06 325440

#### ELECTRONIC INTERLOCKING TO BE TRIED IN JAPAN

Early in 1981, the interlocking at Ishiuchi on the Joetsu Line of Japanese National Railways will be performed by computers, working in parallel with a conventional relay interlocking so as to check the integrity of the new technology under field conditions. System design avoids the need for a large number of programs by aggregating non-vital tasks, while reliability and safety are assured by two-out-of-three voting in a triple-redundant system. In addition, fail-safe fault detecting functions watch for component malfunction and shut down the subsystem affected, thus protecting overall safety.

Okumura, I (Railway Technical Research Institute) *Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1043, 3 Fig., 4 Phot., 6 Ref.

ORDER FROM: ESL

DOTL JC

06 325441

#### BRIGHTON LINE RESIGNALING ENHANCES TRAIN RUNNING AND PASSENGER INFORMATION

Two of the largest and most complex resignalling schemes yet undertaken are in progress on BR's Southern Region. When completed at Clapham Junction in 1984 and Three Bridges in 1987, two signalboxes will control 888 track-km over which 1800 daily trains carry 200,000 passengers in a complex pattern of high-density suburban services. Although the schemes involve replacement of signalling and some track, the objective of the comprehensive renewal is to improve train movement through enlargement of control areas. Data provided by the train describer will widen Southern Region's plans to generate train running reports and passenger information automatically by comparing the actual situation with a stored timetable.

Whitehouse, WH. *Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1047, 4 Fig., 3 Phot.

ORDER FROM: ESL

DOTL JC

06 325442

#### TRACTION CROSS-BONDS AND AC TRACK CIRCUITS

A combination of cross-bonds and broken rails poses problems for all audiofrequency track circuits. Recommendations are made for minimizing

the problem by using a center-tapped impedance bond for the cross-bond connection, or if the track circuit is inherently protected from run-around feeds from adjacent track circuits, then the problem may be avoided completely by having only one cross-bond per track circuit.

Miller, GD *Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1052

ORDER FROM: ESL

DOTL JC

06 325443

## BCR PIONEERS COMPUTERISED TRAIN CONTROL USING MICROWAVE RADIO

After 9 years of research British Columbia Railway and Glenayre Electronics have developed a computerized train location, identification and control system--LIC, for short--based on microwave radio. Following successful trials BCR is now installing equipment to cover the 240 km between North Vancouver and Lillooet. In 1982 LIC should take over from the existing CTC. Cost is estimated at 20 percent of that of CTC, including equipping locomotives and cabooses, all communications, construction of a control center and trackside equipment. Transport Canada and provincial funding has made a major contribution to the research and development program.

*Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1054, 1 Fig., 1 Phot.

ORDER FROM: ESL

DOTL JC

06 325444

## BERLIN U-BAHN BEGINS AUTOMATIC TRAIN OPERATION

Early in 1981 Line 4 of the Berlin U-Bahn was to be switched to automatic train operation. German's Federal Ministry of Research and Technology has been funding since 1977 trials on a 1.6 km test track fitted with Seltrac equipment. Operation in revenue service will test the technical and economic viability and determine what steps are necessary to achieve unmanned operation.

*Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1055, 6 Phot.

ORDER FROM: ESL

DOTL JC

06 325714

## PROCEEDINGS OF THE OCTOBER 1979 WORKSHOP FOR CLASSIFICATION YARD TECHNOLOGY "A STATUS REPORT ON YARD RESEARCH"

The Classification Yard Technology Workshop was sponsored by the Federal Railroad Administration (FRA) to present the results of current yard research under the Railroad Operational Improvements Program. The major program objectives are the development of technologies, quantification of areas for improvement, evaluation of components and systems, and improvement of effectiveness of railroad communication and control systems. These proceedings include the technical papers, responses to the workshop questionnaire, and comments of conference participants and panel members of the following areas of research: Yard Design Methods, New Concepts in Car Speed Control, Improvements for Car Presence Detection, Measurements of Rolling Resistance, Electromagnetic Compatibility, and Yard Computer Systems.

Witt, ES Shedlock, N  
Pacific Consultants, Federal Railroad Administration FRA/ORD-80/17,  
PC-DOT-01, Dec. 1980, 208p, Figs., Tabs., Refs.

Contract DOT-FRA-9126

ORDER FROM: NTIS

PB81-143315, DOTL NTIS, DOTL RP

06 325738

## FEASIBILITY OF LORAN-C IN DETERMINING POSITION OF RAIL VEHICLES IN TRANSIT

This report describes nine field tests to evaluate the feasibility of using the LORAN-C system to locate rail vehicles in transit. The test was conducted over railroad routes between Van Wert, OH and Bound Brook, NJ. The test indicates that the LORAN concept is feasible although there are technical limitations: power and communication lines create severe electromagnetic interferences; terrain and structures distort the LORAN signal. The overall accuracy is on the order of one mile. For test runs totalling 300 miles, a usable signal was received for 77% of the mileage covered.

Donahue, J Conner, J

ENSCO, Incorporated, Federal Railroad Administration FRA/  
ORD-80/84, DOT-FR-80-32, Nov. 1980, 28p, 8 Fig., 2 Tab.

Contract DOT-FR-53-80-C-00002

ORDER FROM: NTIS

DOTL NTIS, DOTL RP

06 325743

## CIRCUITS OF AUTOMATIC CAB SIGNALISATION AND SAND APPLICATION IN THE TYPE 2M62 DIESEL LOCOMOTIVE

[Cepi ALSN i podaci peska na teplovoze 2M62]

Diagrams of the equipment and operation of the circuits of the automatic cab signals and the circuit for automatic sand application during emergency braking. [Russian]

Konovalov, VG Bacuk, BP *Elektricheskaya i Teplovoznaya Tiaga* No. 7, 1980, pp 18-21

ACKNOWLEDGMENT: International Union of Railways, BD

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

06 325928

## TECHNIQUES AND APPLICATIONS OF RAIL HEAD

### CONTACTS [Technik und Anwendung des Schienenkopfkontaktes]

Electronic rail head contacts can be considered one of the most complicated forms of such contacts because of their size, electrical properties and the resulting spectrum of application. They have been used for some years in marshalling yards, particularly where there is computer control. The article also quotes certain areas where such contacts can be used.

Christoph, H *Signal und Draht* Vol. 72 No. 9, Sept. 1980, pp 166-172, 2 Tab., 6 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

06 326382

## EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY. TASK 4: ELECTRICAL NOISE DISTURBANCE

This report defines electromagnetic interference (EMI) generated by wayside and vehicle-mounted equipment associated with railroad electrification. The report describes the adverse effects of EMI upon existing and potentially applicable signal/control systems. Functional requirements for EMI control are defined and recommendations are made for follow-on testing activity. The problems of vandalism are also considered.

See also report on Task 3, PB80-142441. Prepared in cooperation with Dyer (Thomas K.), Inc., Lexington, MA., and Kentron International, Inc., Dallas, TX.

Taylor, SF Marshall, JF Schultz, CM Whalen, RB  
STV, Incorporated, Federal Railroad Administration Final Rpt. FRA-  
/ORD-78/39.4, July 1980, 133p, 17 Fig., 4 Tab.

Contract DOT-FR-773-4236

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB81-111130, DOTL NTIS, DOTL RP

06 329526

## DESIGN OF A TUNNEL RELAY SYSTEM WITH A LEAKY COAXIAL CABLE IN AN 800-MHZ BAND LAND MOBILE TELEPHONE SYSTEM

In this system, several dozen rf signals from a base station or many different mobile units in the tunnel are directly amplified in the rf stage, without frequency conversion, by a common amplifier in the relay equipment installed near the tunnel entrance, then radiated into the tunnel through a leaky coaxial cable (LCX) or to the base station by a unidirectional antenna. Repeaters are inserted along the LCX to compensate for transmission loss in rf signal power inside the cable. Amplifying a number of rf signals simultaneously, a common amplifier generated intermodulation products and radiates spurious signals. The required amplifier linearity to suppress the spurious signals is discussed in detail. The combination of LCX and service area in the tunnel is determined according to the amplifier performance, the number of radio channels assigned to the base station, and the radio wave propagation characteristics in the tunnel.

Suzuki, T Hanazawa, T Kozono, S *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 3, Aug. 1980, pp 305-316, 17 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

06 329542

**AUTOMATING THE OPERATION OF THE METRO IN  
AMSTERDAM, HOLLAND [Die Betriebsautomatisierung der Metro  
Amsterdam]**

A train protection and automatic control system is described. The entire sequence of operations is controlled and monitored by a central traffic directing station. During regular operation, the sequence of operations is automated. With this, trains are automatically directed by a linear train control, at which the computer controlled system guarantees maintenance of running time with a minimum consumption of energy. [German]

Sperli, H *Elektrische Bahnen* Vol. 78 No. 3, Mar. 1980, pp 71-74

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

7



07 314399

**CATALOG OF TRAINING MATERIALS FOR THE RAILROAD INDUSTRY**

The document lists training materials that are available to the railroad industry. Some were produced specifically for the industry; many were produced for non-railroad employees but are readily adaptable or directly usable. In order to avoid duplication of existing materials, this catalog does not include training that has been produced by the industry itself.

Varadarajan, R LeLacheur, JE  
Hampton (Delon) and Associates, Federal Railroad Administration Final  
Rpt. FRA-RFA-80-01, Mar. 1980, 435p

Contract DOT-FR-9-031

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-193097, DOTL NTIS

07 319396

**REVIVING RAILROAD EDUCATION IN THE UNITED STATES: PROGRAMS FOR THE 1980S AND BEYOND**

The results of a survey on the modern educational needs of the railroad industry, conducted with more than 90 senior-level members of the railroad industry, government agencies, suppliers, consultants, associations, and universities, are discussed. The consensus view is that the industry's educational needs can best be met by a combination of focused and practical seminars and short courses for present and prospective professional employees, support for enrichment of the railroad content of university course offerings in transportation, a university railroad research program, and support of fellowships. The railroads are having little difficulty in attracting talented people, but these new employees typically have no specialized railroad knowledge, and this adversely affects job expectations, career motivation, and employee retention. Railroads actively recruit the small number of new graduates who have training in the rail field. The other segments of the industry have greater recruiting problems and correspondingly greater needs for improved education programs. It is concluded that the recommended university programs will have an immediate and positive impact on railroad job recruiting and will help to strengthen innovation in the railroad industry. (Author)

This paper appeared in TRB Research Record No. 748, New Directions in Transportation Education.

Patton, EP Langley, CJ, Jr Bronzini, MS *Transportation Research Record* No. 748, 1980, pp 5-12, 1 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

07 319665

**SYSTEMS-ERGONOMIC APPROACHES TO DESIGN AND OPERATION OF TODAY'S RAILROADS**

This paper describes the systems-ergonomic approaches which have contributed to the design and operation of the Shinkansen and mass-transport narrow-gauge railroad lines operated by the Japanese National Railways (JNR). According to the JNR's research and operational results, man-machine matching at component levels is not sufficient in large complex man-machine systems. Of importance are the recognition of the hierarchy in man-machine matching and system design based on this recognition, the philosophy of analyzing man's involvement with the system functions and assigning roles to man, and thorough ergonomic study of the information system governing the system activities.

Iiyama, Y *Human Factors* Vol. 22 No. 1, Feb. 1980, pp 15-24, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

07 322561

**PSYCHOLOGICAL STUDY OF THE ABILITY OF TRAM DRIVERS TO ADAPT TO OTHER TRAMS; MODIFICATION OF REACTIONS WHEN TRAM TYPES ARE CHANGED**

[Verkehrspsychologische Untersuchung der Umstellfaehigkeit von Strassenbahnwagenfuhrern Aenderung des Reaktionsverhaltens beim wechsel der Wagentype]

Two different tram-car types are in operation in Graz, and these have to be operated differently. Emergency braking requires quite different actions (use of a handbrake or footbrake). Both types of tram have hitherto been driven

by different groups of drivers. For operational reasons it would be desirable to use drivers on both types of tram. The object was to test whether changing of the vehicle type would lead to slower reactions which might endanger safety. Tests were carried out on 20 drivers of each type of tram; they had to carry out emergency braking on receiving an optical signal and reaction times were measured. Each driver had to undertake 3 tests-in his normal tram, in the strange tram and again in his normal tram. There was no significant difference in reaction times of either group. Reaction times for older drivers were longer than for younger drivers, but they were no worse at changing from one tram to another. [German]

Schuetzenhoefer, A

Road Safety Board, Austria Monograph Oct. 1978, 15p, 5 Tab., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 309412), Road Safety Board, Austria  
ORDER FROM: Road Safety Board, Austria, Zweigstelle Steiermark, Neutor-  
gasse 51, Graz, Austria

07 323360

**RESEARCH ON A COMFORT INDEX FOR RAILWAYS-BIBLIOGRAPHIC INVESTIGATION OF COMFORT STUDIES CONDUCTED IN TRAINS [Recherche d'un indicateur de confort de chemin de fer. Approche bibliographique des etudes de confort realisees dans les trains]**

This bibliographic study shows that the aim of the investigations already carried out was to establish comfort indices solely based on vibration parameters. A few authors have included in the overall concept of comfort several other parameters but comfort in trains was studied by means of physiological measurements. [French]

Deumegoux, JP

Institute of Transport Research Monograph Mar. 1978, 42p, 6 Fig., 8 Tab., 28 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 105897), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Institute of Transport Research, Avenue Salvador Allende  
109, Bron Cedex, France

07 323365

**TRANSPORT FOR HANDICAPPED PEOPLE [Les transports au service des handicapes]**

This publication reproduces the text of the report of the working group set up by decision of the 18th August 1975 for considering transport facilities for handicapped people. The integration of handicapped people in the professional environment and in society is conditioned by the autonomy granted to them. The problems of the transport of handicapped people are reviewed and possible solutions suggested: modification of existing public transport modes, creation of special public transport modes, use of individual transport. [French]

Bachelier, C

Secretariat d'Etat aux Transport Monograph 1977, 57p

ACKNOWLEDGMENT: TRRL (IRRD 105730), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Secretariat d'Etat aux Transport, Boulevard Saint Germain  
244, Paris, France

07 324409

**STANDARDS OF RIDING QUALITY IN FOREIGN RAILWAYS**

The riding quality is defined as the degree of comfortableness controlled by all senses or feelings of passengers riding in a running train. The relation between vibrations and the riding quality is studied. Several cases of study made on the relation between the human feeling against vibrations and speed or acceleration and the evaluation standards are explained.

Uetake, Y (Japanese National Railways) *Permanent Way* Vol. 22 No. 1,  
Mar. 1980, pp 15-22

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

07 324498

**HUMAN FACTORS CONSIDERATIONS IN LOCOMOTIVE CAB DESIGN**

This report contains recommendations for the improvement of locomotive cab design from a human factors point of view. Observational data, interview

findings, literature reviews, accident analysis and experimentation under simulated conditions served as a basis for formulating proposals for an improved work place (e.g. control of vibration, noise, microclimate and injury prevention), greater crashworthiness, and modifications in the design of displays and controls. The concept of a vigilance device which is sensitive to task-oriented attention has been developed. This device verifies whether the engineer's attention is directed toward advance block signals and intervenes when it is not.

Wilde, GJS Stinson, JF  
Canadian Institute of Guided Ground Transport, (7.65.76) Final Rpt.  
CIGGT 80-9, July 1978, 178p, Figs., Tabs., Refs., 3 App.  
ORDER FROM: CIGGT

DOTL RP

07 324942

#### BETTER DESIGN OF DRIVER'S CAB BASED ON HUMAN ENGINEERING

Heavy physiological and psychological strains are imposed on drivers by the speed and frequency of traffic operations. This article describes new cab arrangements designed to reduce strains on the driver as far as possible, to make driving easier and reduce the risk of human failure.

Yamauchi, K *Japanese Railway Engineering* Vol. 20 No. 1, 1980, pp 20-22, 6 Phot.

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

DOTL JC

07 325754

#### THE PUBLIC IMAGE OF PUBLIC TRANSPORT BY RAIL AND ROAD [Image de marque des transports collectifs ferroviaires et routiers]

The results of interviews carried out in different social groups has allowed the psycho-sociological factors which influence the attitudes of population groups towards local public transport to be analysed. The analysis is made in terms of the requirements for movement according to three variables: habit, obligation and desire. The dominant image is of the attachment to public transport and more particularly to transport by rail. [French]

Direction des Transports Terrestres Monograph Apr. 1979, 125p, Tabs.

ACKNOWLEDGMENT: TRRL (IRRD 105811), Central Laboratory of Bridges & Highways, France, Institute of Transport Research  
ORDER FROM: Direction des Transports Terrestres, Seretès, Boulevard Saint-Germain 244, Paris, France

07 325879

#### A GUIDE TO BRITISH RAIL FOR THE PHYSICALLY HANDICAPPED (REVISED 1979 EDITION)

The guide describes facilities introduced by British Rail at stations and in train design to aid disabled passengers. Sections list British transport hotels and stations within commuting distance of London, as well as those frequently used for leisure travel, which offer special facilities for the disabled user of public transport.

Royal Association for Disability & Rehabilitation Monograph 1979, 288p

ACKNOWLEDGMENT: TRRL (IRRD 250068)  
ORDER FROM: Royal Association for Disability & Rehabilitation, 25 Mortimer Street, London, England

07 325916

#### ADAPTING PUBLIC TRANSPORTATION SERVICES FOR DISABLED PERSONS [Tilpasning af de kollektive trafikmidler til handicappede]

The Committee on Communications of the Nordic Council deals with the problems of disabled persons' travelling conditions in public transport. Among the disabled those who are wheelchair-bound have the greatest problems. The new DSB high-speed trains will be fitted with lifting platforms which can raise a chair from ground level, with WC which can allow wheelchair access and a special compartment with removable chairs to give space for wheelchairs. The lifting platform, which has a capacity of 400 kg, is described. When not being used, the wheelchair lift can be pushed under the car floor. [Danish]

Brogaard, H *DSB Bladet* Vol. 7 No. 4, 1980, pp 10-11, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Danish State Railways, Soelvgade 40, DK-1349 Copenhagen K, Denmark

07 325930

#### BR'S LINE ON SAFETY

Analyses the techniques used by BR to convey the safety message.

McKinnon, R *Occupational Safety and Health* Vol. 10 No. 9, Sept. 1980, pp 10-12, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Royal Society for the Prevention of Accidents, 52 Grosvenor Gardens, London SW1, England

07 326358

#### RAILROAD MANAGEMENT AND ENGINEERING: EDUCATIONAL NEEDS AND RECOMMENDED PROGRAMS

The modern educational needs of the rail industry can best be met by a combination of focused and practical seminars and short courses for present and prospective professional employees, support for enrichment of the railroad content of university transportation offerings, a university railroad research program, and fellowship support. This is the consensus of more than 90 senior-level individuals interviewed, representing all segments of the industry, including railroads, Government agencies, suppliers, consultants, associations, and universities. The railroads state that they are having little difficulty in attracting talented people, but new employees typically, have no specialized railroad knowledge, which adversely impacts job expectations, career motivation, and employee retention. Railroads actively recruit the small number of new graduates with rail training. Suppliers, Government agencies, and consultants have greater recruiting problems and correspondingly have greater needs for improved educational programs. The recommended university programs will have an immediate and positive impact on railroad recruiting and will help to strengthen innovation in the railroad industry.

Patton, EP Langley, CJ, Jr Bronzini, MS Rochelle, RW Googe, JM  
Tennessee University, Knoxville, Federal Railroad Administration Final Rpt. TC-79-015, FRA-OPPD-80-3, Mar. 1980, 198p, 18 Fig., 3 Tab., 11 App.

Contract DOT-FR-9037

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB81-104689, DOTL NTIS, DOTL RP

08 165511

## CRITERIA USED BY STATE HIGHWAY AGENCIES TO DETERMINE WARRANTS AND PRIORITIES FOR WARNING DEVICES AT RAIL-HIGHWAY CROSSINGS

The purpose of this study is to determine the warrants and/or criteria currently used by the individual states for applying various levels of rail-highway crossing warning devices, and what procedures each state uses to determine crossing improvement priorities. The objectives of this research study are: Obtain current information from each state about rail-highway crossing warrants and priorities for warning devices construction or improvements. Examine individual methods used to determine rail-highway grade crossing improvement warrants and priorities. Compare and analyze vehicle-train (VT) exposure indexes that the states use to develop their crossing warning standards and warrants. And, prepare a summary of the survey information and analysis for distribution to participating states so that each state can become aware of the national trends in warrants and priorities for rail-highway crossing warning devices. The study concluded that vehicle train exposure factors and previous accident history are the most frequently used parameters in determining improvement priorities by state highway agencies. Rail-Highway advance warning devices provide a better return of improvement expenditures for accident reduction than do grade separation structures. Each state has unique highway improvement needs and different revenue resources.

Sanford, JL (Illinois Department of Transportation)  
Illinois University, Urbana Res Rpt. No. 8, Apr. 1977, 115p, 8 Tab., 11 Ref., 2 App.

08 195591

## MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES

This report describes a two-year study of some of the basic problems involved in improving the design of active warning devices intended to make motorists more aware of grade crossing hazards. Emphasis was placed upon improvement of the attention-getting aspect (conspicuity) of active crossing warning devices which was presumed to positively correlate with improvements in grade crossing safety. An indoor laboratory test was conducted in the FAA Low Visibility Research Facility located at the University of California. In excess of 150 subjects gave over 20,000 responses to flashing light displays. Results were analyzed to determine effects of color, flash rate, brightness, size and placement under daylight, darkness and daytime fog conditions. The laboratory tests resulted in development of two improved devices which were field tested on actual grade crossings. The first device consisted of an array of three eight-inch white (clear) strobe lights added to a standard flashing warning system at a high accident rate urban crossing in Richmond, CA. The second was a gate arm add-on device consisting of three small strobes, red, white (clear) and blue in color installed at a rural highway grade crossing with high speed truck and automobile traffic. Due to project constraints, no long term safety improvement analysis could be conducted. Because there was no evidence of driver confusion during the conduct of these field tests, it was concluded that colored lights other than red can be used in moderation as add-on to existing active crossing warning devices to increase the attention getting property of the warning system. The high composite (not from a single source) flash rate devices that were installed did not result in any erratic driving behavior on the part of approaching motorists. /FHWA/

Sponsored by the Department of Transportation, Federal Highway Administration, Office of Research Traffic Systems Division.

Ruden, RJ Wasser, CF Hulbert, S Burg, A  
MB Associates, (MB-R-77/72) Final Rpt. FHWA-RD-77-167, Oct. 1977, 270p

RESPONSIBLE INDIVIDUAL: Coleman, J

Contract DOT-FH-11-8846

ACKNOWLEDGMENT: Federal Highway Administration, NTIS  
ORDER FROM: NTIS

PB-296183/7ST

08 318987

## OPERATIONAL TESTING OF LOCOMOTIVE-MOUNTED STROBE LIGHTS

The report describes revenue-service tests of locomotive-mounted strobe lights used to make trains more conspicuous to motorists at rail-highway

crossings. The testing, conducted in cooperation with four railroads, had the objectives of assuring practicality compatibility with normal operations, validating previous cost estimates, and obtaining a measure of safety effectiveness. Prior research underlying the tests is reviewed briefly.

Sponsored in part by Federal Railroad Administration, Washington, DC. Office of Research and Development.

Hopkins, JB  
Transportation Systems Center, Federal Railroad Administration Intrm Rpt. DOT-TSC-FRA-80-15, DOT-TSC-FRA-80-48, June 1980, 37p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-224348, DOTL NTIS

08 319932

## GRADE CROSSING SAFETY--TODAY'S NEEDS: MORE COORDINATION, COOPERATION--AND MONEY

Federal funding of grade crossing improvements, currently threatened with cutbacks, is probably the most cost effective highway safety program in terms of casualty reduction. A lack of uniformity in state government support, project appraisal methods, standards for crossing warning devices and responsibility for crossing maintenance complicate the problems. Possibilities are national standardization or improved coordination between governments and the industry. A listing of grade crossing surfaces and comments on warning devices appears separately.

*Railway Age* Vol. 181 No. 15, Aug. 1980, p 32, 1 Phot.

ORDER FROM: ESL

DOTL JC

08 319962

## FUTURE INVESTMENT PROGRAM FOR LEVEL CROSSINGS--REVIEW OF MEASURES AND RESULTS [Zukunftsinvestitionsprogramm in Bahnuebergangsbereich--Bestandsaufnahme und Ergebnis]

The program for future investment has given special consideration to the replacement of level crossings by overpasses. The preparation, special conditions and progress of the program are described. The stage reached shows that the operation has been successful. [German]

Mueller, W *Die Bundesbahn* Vol. 56 No. 4, Apr. 1980, pp 257-262, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

08 320301

## GRADE CROSSING INVENTORY SYSTEM (GCIS)

For all types of crossings, information such as identification number, railroad, railroad division, subdivision, milepost and branch, state, county, city or nearest city, street or highway, and crossing type is available. In addition, for public at grade crossings, information includes number of daily train movements, train speeds, type and number of tracks, details of crossing protection both active and passive, crossing angle, number of traffic lanes, daily highway traffic volume, pavement markings, advance warning signs, crossing surface, highway system, percentage of trucks and other items. The system is updated continuously as updates are received. The only report, Railroad-Highway Crossing Accidents, is published annually.

Hardcopy report-Railroad-Highway Crossing. Accidents (Annual); Magnetic tapes and cards. Data are supplied by states and railroads.

Department of Transportation On-Going No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (301)  
ORDER FROM: DOT

08 320853

## RAIL HIGHWAY GRADE CROSSING ACCIDENT/INCIDENT REPORT

This tape presents results from the Railroad Accident/ Incident Reporting System. There are over 50 fields which include information on location, time, highway user, railroad equipment, environment (weather), train and track, crossing warning, motorist action, and highway vehicle and rail equipment property damage/casualties, 1976. An annual report is also published.

Computer tapes: 2 tapes, 9 track, 800 BPI, FR016-EBDCIC, FR017-ASCII.

Federal Railroad Administration Annual No Date, n.p.



ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (853)  
ORDER FROM: FRA

08 322041

**RUBBER RAILROAD CROSSING BUILT LIKE A POST-TENSIONED SUSPENSION BRIDGE**

The article discusses the "Rigid-Flex" rubber railroad grade crossing system, which it describes as being engineered in the same manner as a bridge; although it is positioned for ground application the system still basically remains a bridge in design. In addition, characteristics of rubber crossings in general are discussed, including advantages, installation, performance and costs.

*Better Roads* Vol. 50 No. 3, Mar. 1980, pp 24-25

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

08 324458

**RAILROAD-HIGHWAY GRADE CROSSINGS: NOT JUST AN ENGINEERING PROBLEM**

While more than 50,000 rail/high grade crossings--about a quarter of all such public intersections--have some form of automatic warning device and such installations are being made at an increasing rate, the frequency of grade crossing accidents at these locations is also increasing. The author discusses this and other facets of the crossing problem and makes recommendations for reduction of accidents: All levels of government and the railroad industry need to communicate and cooperate; better research is needed on driver behavior; and driver education must incorporate rail/highway crossing safety as an integral part of the instructional package.

Sonefeld, OF (Atchison, Topeka and Santa Fe Railway) *Transportation Research News* No. 91, Nov. 1980, pp 7-9, 3 Phot.

ORDER FROM: TRB Publications Off

DOTL JC

08 325709

**EFFECT OF WINTER CONDITIONS ON THE SAFETY OF HIGH SPEED TRAINS ON THE MONTREAL-QUEBEC LINE**

The Montreal-Quebec portion of the Quebec-Windsor corridor, on which high speed passenger train service is planned, is unique in having winter conditions more severe than on any other route on which similar service is being planned or operated in the world. As a result, the potential effects of these conditions on the safety of trains is substantial. Some of the problems involved can be handled by present technology and extension of current practices. Examples are the control of frost heaving of track, reduced snow drifting, and maintenance of level crossings. Due to the difficulty of detecting the approach of high speed trains in blowing snow conditions, it is proposed that all protected crossings be equipped with barrier gates and all unprotected crossings and farm crossings be closed in winter. Special studies are required to reach decisions on the best means of reducing danger to trains from hitting either heavy windblown drifts or ridges of hard snow left across the track by road plows at level crossings.

Railroad-Highway Grade Crossings: Update, Bibliography 58.

Peckover, FL

Transport Canada Research and Development Centre June 1977, 46p

ORDER FROM: Transport Canada Research and Development Centre, Technology Branch, Montreal, Quebec H3A 2R3, Canada

08 325711

**STUDY TO DEFINE THE REQUIREMENTS FOR RAILWAY LEVEL CROSSING PROTECTION ACCEPTABLE FOR TRAIN OPERATION AT SPEEDS UP TO 200 KM/H**

The report analyzes accident reports from both railway and highway department records to identify causal factors in grade crossing accidents, classified in relation to possible counter-measures designed to prevent the consequential train/highway-vehicle collision. New conditions created by train speeds up to 200 km/h over grade crossings, are identified, and protective systems are proposed to achieve appropriate standards of accident prevention.

Railroad-Highway Grade Crossings: Update, Bibliography 58.

Canalog Logistics Limited TP 1996, Aug. 1978, 375p

ORDER FROM: Transport Canada Research and Development Centre, 1000 Sherbrooke Street, West, P.O. Box 549, Montreal, Quebec H3A 2R3,

Canada

08 325869

**TRAFFIC ENGINEERING SERVICES-MANUAL ON RAILROAD-HIGHWAY GRADE CROSSINGS [Servicos de engenharia de trafego--manual de cruzamentos rodo-ferroviarios]**

This report was prepared by traffic safety engineers aiming towards the improvement of traffic safety conditions, as well as operational levels of service at railroad-highway grade crossings. [Portuguese]

Ministry of Justice Monograph 1979, 139p, 4 Fig., 5 Tab., 32 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 250143)

ORDER FROM: Ministry of Justice, Esplanada dos Ministerios, Brasilia, Brazil

08 325884

**RAIL-HIGHWAY GRADE CROSSING PROGRAM--A STATE'S VIEW**

Rail-highway grade crossing safety programs are being approached in many states on a broad basis. There is some evidence that rather than merely installing more active protection devices it may be more appropriate to upgrade existing devices using equipment that will make the flashing lights and/or gates more creditable. Removing or paving over abandoned or unused crossings are also proposed as cost-effective actions.

Proceedings of the Special Conference-Implementing Highway Safety Improvements, San Diego, California, March 12-14, 1980.

Craven, RE (Department of Transportation)

American Society of Civil Engineers 1980, pp 124-129

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE

08 325885

**RAILROAD HIGHWAY GRADE CROSSING PROGRAM--RAILROAD VIEW**

During the 1970's with the implementation of federally funded safety improvement programs, considerable progress was made by the joint cooperative efforts of governmental agencies and the railroad industry. This paper discusses other programs in progress or planned through the early 1980's which will further enhance grade crossing safety.

Proceedings of the Special Conference-Implementing Highway Safety Improvements, San Diego, California, March 12-14, 1980.

Kull, FJ

American Society of Civil Engineers 1980, pp 130-134

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE

08 329975

**AN EVALUATION OF SIX CONFIGURATIONS OF THE RAILWAY CROSSBUCK SIGN**

Two experimental versions of the x-shaped railway crossbuck sign (white with red border, and yellow with black border) and the Canadian standard were compared in a series of four experiments. The angular separation between the blades of the sign was varied (45 deg and 90 deg), and all signs were tested against both a grass-green and a sky-blue background. Standard Canadian regulatory and warning signs were used as distractor stimuli in all experiments. Laboratory measures of classification time, glance legibility, and legibility distance indicated the experimental versions to be generally superior to the existing standard. Legibility distance was greater for signs with blades separated by 90 deg than for those with 45 deg angles. A final experiment revealed initial comprehension of the red and white crossbuck to be better than that for the yellow and black version.(a)

Ellis, JG Dewar, RE Milcoy, DG *Ergonomics* Vol. 23 No. 4, Apr. 1980, pp 359-367, 1 Fig., 4 Tab., 8 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 251347)

ORDER FROM: ESL

DOTL JC

09 053372

**STANDARDISATION OF WAGONS. THE INFLUENCE OF THE STRAIN RATE ON THE YIELD POINT OF STEEL--EFFECT OF REPEATED IMPACTS ON THE YIELD POINT OF THE STEEL**

This report describes the execution and analysis of the following tests: Tensile tests with different impact loading rates on test pieces made of St 38-3 and H 52-3 Steels; and Fatigue tests on test pieces made of H 52-3 steel, previously exposed to a given number of impact loads corresponding to a given strain rate. It contains, among other things, findings relating to nature and severity of the experimentally demonstrated influence of the strain rate on the yield point of the above-mentioned materials, which are used in the construction of wagons. The analysed strain rate interval includes the deformation rates occurring during 15 km/h buffing impacts with loaded 4-axled wagons.

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

International Union of Railways B 12/RP 29, Oct. 1979, 31p, 25 Fig., 6 Tab.

ORDER FROM: UIC

DOTL RP

09 053374

**NON-DESTRUCTIVE EXAMINATION PROCEDURES. TERMINOLOGY OF NON-DESTRUCTIVE MATERIAL TESTING**

This report contains a trilingual terminology concerning material defects, ultrasonic and magnetoscopic testing by the E 139 Specialists Committee.

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

International Union of Railways E 139/RP 2, Apr. 1979, 114p, 30 Fig.

ORDER FROM: UIC

DOTL RP

09 314102

**EVALUATION OF EXISTING FLAMMABILITY TEST METHODS BY COMPARISON OF THE FLAMMABILITY CHARACTERISTICS OF INTERIOR MATERIALS**

Twenty aircraft materials representing a cross section of the interior of a wide-bodied passenger compartment were tested by five laboratory test methods for comparability. The five test methods utilized were: (1) Radiant Panel, (2) Rate of Heat Release, (3) Vertical Bunsen Burner, (4) Limited Oxygen Index, and (5) Thermogravimetric Analysis. Correlation of the results obtained from the five test methods were made for ignitability, flame spread, heat release, performance, heat flux exposure, and ranking of materials by performance. Heat release data obtained from the Rate of Heat Release Apparatus and the E-162 radiant panel indicate the best correlation for panels. (Author)

Nicholas, EB

National Aviation Facilities Experimental Center Final Rpt.  
FAA-NA-79-46, Mar. 1980, 54p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A083137/0

09 314149

**FIRE AND FLAMMABILITY CHARACTERISTICS OF MATERIALS USED IN RAIL PASSENGER CARS. A LITERATURE SURVEY**

A literature search was conducted to provide information on the flammability characteristics of materials that are used, or have potential use, in furnishing the interiors of rail passenger cars. Among the characteristics of interest were the ignition temperature, time to reach ignition, the rate of flame spread, the rate of combustion or rate of material loss, rate of heat liberation, heat transfer from flames, the evaluation of smoke, the measurement of smoke density, and the evolution and toxicological effect of the products of combustion. In addition, information was collected on flammability test methods, fire prevention standards or codes, and statistical data concerning accidents involving vehicle fires of interior origin. The information compiled is to be used to assist the Federal Railroad Administration, Department of Transportation (FRA/DOT) in establishing safety standards regarding the flammability of the materials used in the interiors of rail passenger cars. 226 References are given.

Shared Bibliographic Input Experiment.

Rakaczky, JA

Aberdeen Proving Grounds Final Rpt. ARBRL-MR-03009,  
SBIE-AD-e430-406, Apr. 1980, 101p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A084028/0

09 318246

**FUTURE TRENDS IN FRACTURE MECHANICS: THEORY AND APPLICATIONS**

A brief description of the current methods available for the analysis of fracture in ductile materials is given. Crack-opening displacement, R-curves and J-integrals are discussed and their future incorporation into structural codes assessed. The current areas of research which will probably influence code making bodies are also described. Emphasis is made on J-integral theory and a description of its limitations and extensions. Numerical techniques for calculating J for complicated structure are outlined. (Atomindex citation 09:411679)

Seminar on failure analysis and fracture control, Kingston, Canada, 8 May 1978. U.S. Sales Only.

Hosbons, RR

Atomic Energy of Canada Limited CONF-7805147-1, May 1978, 21p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AECL-6198

09 318730

**HAND-HELD RAILROAD DATA ACQUISITION SYSTEM**

The invention is a data acquisition system including a condition responsive sensor for producing an analog signal indicative of a given variable condition, a delta modulator circuit connected to receive and convert the analog signal into a modulated pulse train indicative of the given condition, an encoder circuit connected to receive and convert the modulated pulse train into an audio output signal, and a recorder connected to receive and record the audio output signal. The encoder produces Harvard phase coding of the modulated pulse train and produces an audio output signal in a range between 1000 and 3000 Bauds that is compatible with cassette tape recorders.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Long, LE Sarkisian, EA

Department of Transportation PAT-APPL-6-158 907, DOT/CA-SE/TSC-10147, No Date, 14p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-196900

09 318812

**POSTMORTEM METALLURGICAL EXAMINATION OF A FIRE-EXPOSED SPENT FUEL SHIPPING CASK**

A postmortem examination of a large fire-exposed rail-transported spent fuel shipping container has revealed the presence of two macrofissures in the outer cask shell. The first, a part-thru crack located within the seam weld fusion zone of the outer cask shell, was typical of hot cracks that may be found in stainless steel weldments. The second, located within the stainless steel base metal, apparently originated at microcracks formed during the welding of a copper-stainless steel dissimilar metal joint. The latter microcrack then propagated during the fire-test, ultimately penetrating the outer shell of the cask.

Rack, HJ Yoshimura, HR

Sandia Laboratories, Department of Energy Apr. 1980, 35p, 18 Fig., 2 Tab.

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

SAND-79-1424

09 319645

**NEW WAY TO LIGHTWEIGHTING: THIN RESIN-CORE/METAL SANDWICHES**

This paper describes a very thin sandwich structure, composed of extruded PP sheet between steel skins, which may be the most promising approach

to automobile weight reduction yet. And the concept has exciting potential for other industries. These structures can be formed on standard stamping presses. Other combinations are also being looked at. The discussion is presented under headings --steel/PP the workhorse; role for aluminum/nylon; question of recycling; impact on other auto materials.

Wood, AS *Modern Plastics* Vol. 57 No. 4, Apr. 1980, pp 46-48

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

09 319989

**DETERMINING THE RELIABILITY OF DIESEL LOCOMOTIVES**  
Reliability is a characteristic of technical products. It gives an assurance that these products will perform the required function for a given period under the given service conditions. The paper describes a simplified procedure for predicting the reliability in order to focus the interest of the design engineers on these problems. Predicting the reliability, also by way of laborious mathematical methods, will become more important in future, since an assessment of reliability is made an integral part of contracts to an ever-increasing extent. [German]

Zaganescu, I *Glaser's Annalen ZEV* Vol. 104 No. 6, June 1980, pp 156-158

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

09 322791

#### **HIGH-STRENGTH PEARLITIC STEEL DOES WELL IN COMPARATIVE TESTS OF ALLOY RAILS**

Government-sponsored research into new types of rail alloys in West Germany embraced axleloads of 340 kN and 200 km/h speeds. Rails at seven test sites were characterized by pearlitic and bainitic microstructures. Although bainite has a high tensile strength, it is comparatively expensive because of alloying and annealing costs. Other than for special applications such as switch points, high-strength pearlitic steels represent an economical solution where resistance to wear and shelling is important.

Heller, W Schweitzer, R *Railway Gazette International* Vol. 136 No. 10, Oct. 1980, pp 855-857, 4 Fig.

ORDER FROM: ESL

DOTL JC

09 324437

#### **MODERNIZATION OF HORWICH FOUNDRY**

The main factor instrumental in the decision to modernize this foundry was the economics of producing brakeblocks and chairs for the railway at a lower unit cost than available from either the old foundry or the trade. In assessing the financial aspects of the proposal, use was made of a computer model to indicate the strength and weaknesses. This paper discusses the operation and commissioning of the plant.

James, GM *Institution of Mechanical Engineers Proceedings* Conf Paper Vol. 194 Mar. 1980, pp 39-46

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

09 324918

#### **DEVELOPMENT AND TESTING OF A NEW TYPE OF STEEL FOR RAILWAY WHEELS [Entwicklung und Erprobung eines neuen Stahles fuer Eisenbahnraeder]** No Abstract. [German]

Forch, K *Thyssen Technische Berichte* Vol. 11 No. 1, 1979, pp 70-76, 4 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: August Thyssen-Huette AG, Zentrale Forschung der Thyssen-Gruppe, Postfach 67, Duisburg-Hamburg, West Germany 4100

09 325437

#### **CYCLIC PLASTICITY OF CLASS A AND B HEAT-TREATED WHEEL STEELS**

In order to evaluate the material properties of heat-treated wheel steels under cyclic loading, low cycle fatigue tests were conducted at room temperature on specimens taken from the rims of the wheels. The test results show that

Class A and B wheel steels experience significant cyclic softening over the strain ranges studied. The cyclic softening is particularly pronounced at low strain levels. Due to the pronounced cyclic softening at low strain levels the steels will plastically deform, even at stresses below the monotonic elastic limits. Quantitative fatigue properties, which can then be used to predict fatigue lives of various components of wheels under complex service environments, are also obtained from the low cycle fatigue tests.

The General Problem of Rolling Contact, AMD-VOL. 40, from the Winter Annual Meeting of the American Society of Mechanical Engineers, Chicago, Illinois, November 16-21, 1980.

Stone, DH (Association of American Railroads Technical Center);

Park, YJ (Climax Molybdenum Company)  
American Society of Mechanical Engineers Conf Paper 1980, pp 157-167, 11 Fig., 4 Tab., 7 Ref.

ORDER FROM: ASME

DOTL RP

09 325906

#### **PROPERTIES OF RAILWAY RAILS PRODUCED FROM LADLE-REFINED STEEL**

The most effective results are obtained with vacuum degassing and ladle purging with argon and nitrogen. Vacuum treatment reduces the content of oxide phase and oxide stringer length and lowers the hydrogen content to levels at which there is no danger of hairline cracking. Vacuum treatment also lowers the ductile-brittle transition point by 20 deg, reduces anisotropy of ductile and impact properties, and increases design strength. Argon purging reduces the length of oxide stringer inclusions and improves mechanical properties.

Kazarnovskii, DS Levchenko, NF Volkov, IG Gordienko, MS Kravtsova, IP *Steel in the USSR* Vol. 9 No. 11, Nov. 1979, pp 585-589, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

09 326108

#### **A REVIEW OF NONLINEAR FRACTURE MECHANICS RELATIVE TO FATIGUE**

This report reviews currently available parameters, methodology, and data that support further developments in elastic-plastic fracture mechanics (EPFM) technology for modeling fatigue crack growth rate (FCGR) behavior. In general, it can be stated that linearly elastic fracture mechanics (LEFM) parameters can be used to model FCGR behavior except when the zone of cyclic plasticity accompanying the crack process is large with respect to crack length and other structural length parameters. The literature provides two types of EPFM parameters which are available for modeling FCGR behavior when the limitations of LEFM are exceeded: one type is based on the characterization of the intensity of the crack tip stress-strain field, the other is based on the determination of a specific mechanical parameter which is evaluated at a point close to the crack tip. (Author)

Weerasooriya, T Gallagher, JP Rhee, HC  
Dayton University, Air Force Materials Laboratory, (2418) Final Rpt. UDR-TR-79-90, AFML-TR-79-4196, Sept. 1979, 85p

Contract F33615-78-C-5184

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A086671/5

09 329950

#### **INSTALLATION OF INDUCTION HEATING, BEFORE BILLETING, OF FREIGHT CAR AXLES [Installation de chauffage par induction, avant forgeage, d'axes de wagons]**

Actual tendencies and advantages of induction heating before deformation of metals are reviewed, and a large induction heater of 7500 kw, capable of heating square billets 215 mm by 215 mm is described. [French]

Poncin, R *ACEC Revue* No. 2, 1980, pp 12-17, 14 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ateliers de Constructions Electriques de Charleroi, BP4, 6000 Charleroi, Belgium



09 329958

**A NEW WHEEL MEASURING TECHNIQUE: STAGE OF DEVELOPMENT AND POSSIBLE APPLICATIONS**

Berlin Technical University has developed a new signal transmission system. The system utilises the FM technique and permits signals from rolling wheels of non-driven vehicle axles to be transmitted by radio to the vehicle interior. When using suitable transducers at the wheel centres, accelerations, voltages and temperatures can be measured with this new system up to the highest speeds practicable with a wheel/rail system. For acceleration measurements, frequencies up to 10 kHz can be detected at present. An extension of the range up to 20 kHz is possible in a relatively simple way. In the meantime, the two-channel system was extended to five channels. The new wheel measuring procedure forms an essential basis for investigating the mechanisms of noise generation and wheel vibrations. In addition, it could substantially contribute to solving the still outstanding questions in the field of guidance, and it is highly suitable for matching the vehicle and track parameters relevant to vehicle running. [German]

Herbst, W *Glaser's Annalen ZEV* Vol. 104 No. 8-9, Aug. 1980, pp 329-341

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

09 329966

**THE APPLICATION OF OPTICAL FIBRES AS WITNESS DEVICES FOR THE DETECTION OF PLASTIC STRAIN AND CRACKING**

Low cost optical fibres have recently become readily available for telecommunications purposes. Silica fibres are characterised by high elastic strains to failure. The feasibility of using these fibres for structural integrity monitoring particularly for off-shore structures is investigated. The basis of the technique is that a fibre may be bonded to a critical part of a structure and provides an optical path which will be broken if the fibre fails due to plastic strain or crack opening in the critical area. Groups of fibres which have been given predetermined fracture strains by surface etching were encapsulated in special packs. These packs were bonded to steel and concrete tensile specimens. Strain transfer occurred successfully between the specimens and individual fibres. The distribution of strain to fibre fracture appeared to be uniform along the fibre. The use of several fibres with a range of fracture strains caused fibres to break progressively with increasing strain. For applications to offshore structures it has been found possible to use water-repellent adhesives which can be applied and cured in sea water and suffer no deterioration. The advantages of this system include versatility, relatively low cost, adaptability to continuous monitoring and the possibility of being fitted retrospectively and refitted after repair operations.(a)

Hale, KF (National Maritime Institute, England); Hockenhull, BS Christodoulou (Cranfield Institute of Technology, England) *Strain* Vol. 16 No. 4, Oct. 1980, pp 150-154, 2 Fig., 7 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 251364)

ORDER FROM: British Society for Strain Measurements, 281 Heaton Road, Newcastle-Upon-Tyne, NE6 5QB, England

10 315438

**COOPERATIVE EVALUATION OF TECHNIQUES FOR MEASURING DIESEL EXHAUST ODOR USING THE DIESEL ODOR ANALYSIS SYSTEM (DOAS)**

Four cooperative studies were done by nine participating laboratories using common samples. The objectives of these studies were to define the DOAS system variables and to validate and improve the sampling and collection procedures. A fifth study, serving as a review of each analysis step, showed that analysis of common derived odorant samples could be conducted within acceptable limits by the participating laboratories. Three in-house sampling system design and operating parameter studies were conducted simultaneously with the cooperative work. The combined findings from the in-house and cooperative studies led to a tentative recommended procedure for measuring diesel exhaust odor.

Hames, RJ (General Motors Corporation); Slone, RJ (Cummins Engine Company); Perez, JM (Caterpillar Tractor Company); Johnson, JH (Michigan Technological University) *Society of Automotive Engineers Preprints* SAE 800422, Feb. 1980, 18p, 19 Ref.

ACKNOWLEDGMENT:  
ORDER FROM: ESL

10 318267

**ENVIRONMENTAL DATA ENERGY TECHNOLOGY CHARACTERIZATIONS: COAL**

This document describes the activities leading to the conversion of coal to electricity. Specifically, the activities consist of coal mining and beneficiation, coal transport, electric power generation, and power transmission. To enhance the usefulness of the material presented, resource requirements, energy products, and residuals for each activity area are normalized in terms of 10 exp 12 Btus of energy produced. Thus, the total effect of producing electricity from coal can be determined by combining the residuals associated with the appropriate activity areas. Emissions from the coal cycle are highly dependent upon the type of coal consumed as well as the control technology assigned to the activity area. Each area is assumed to be equipped with currently available control technologies that meet environmental regulations. The conventional boiler, for example, has an electrostatic precipitator and a flue gas desulfurization scrubber. While this results in the removal of most of the particulate matter and sulfur dioxide in the flue gas stream, it creates other new environmental residuals--solid waste, sludge, and ash. There are many different types of mined coal. For informational purposes, two types from two major producing regions, the East and the West, are characterized here. The eastern coal is typical of the Northern Appalachian coal district with a high sulfur and heat content. The western coal, from the Powder River Basin, has much less sulfur, but also has a substantially lower heating value. (ERA citation 05:019996)

Department of Energy Apr. 1980, 172p

ACKNOWLEDGMENT: NTIS  
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DOE/EV-0074

10 318291

**ENVIRONMENTAL IMPACT APPRAISAL RELATED TO THE RENEWAL OF MATERIALS LICENSE SNM-1265 FOR THE RECEIPT, STORAGE AND TRANSFER OF SPENT FUEL: MORRIS OPERATION, GENERAL ELECTRIC COMPANY. DOCKET NO. 70-1308**

An Environmental Impact Appraisal for General Electric Company related to the renewal of Material License No. SNM-1265, Docket 70-1308, for a period of twenty (20) years has been prepared by the Office of Nuclear Material Safety and Safeguards. The license authorizes GE to receive, possess, store and transfer spent nuclear fuel at the General Electric Company Morris Operation (Morris Operation) near Morris, Illinois. This environmental impact appraisal discusses the environmental impacts of the proposed licensing action, and includes: a description of the proposed action, a summary of the probable impact of the proposed action on the environment, and the basis for the conclusion that no environmental impact statement need be prepared.

Nuclear Regulatory Commission June 1980, 116p

ACKNOWLEDGMENT: NTIS  
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NUREG-0695

10 318307

**SURFACE ACOUSTICAL INTENSITY MEASUREMENTS ON A DIESEL ENGINE**

The use of surface intensity measurements as an alternative to the conventional selective wrapping technique of noise source identification and ranking on diesel engines was investigated. A six cylinder, in line turbocharged, 350 horsepower diesel engine was used. Sound power was measured under anechoic conditions for eight separate parts of the engine at steady state operating conditions using the conventional technique. Sound power measurements were repeated on five separate parts of the engine using the surface intensity at the same steady state operating conditions. The results were compared by plotting sound power level against frequency and noise source rankings for the two methods.

Presented at the 99TH Acoust. Soc. Of AM. Meeting, Atlanta, 21-25 Apr. 1980.

Mcgary, MC Crocker, MJ  
Langley Research Center NASA-TM-81807, Apr. 1980, 18p

ACKNOWLEDGMENT: NTIS  
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N80-25103/6

10 318312

**INDUSTRIAL HYGIENE REPORT: PRELIMINARY SURVEY OF WOOD PRESERVATIVE TREATMENT FACILITY AT SEAMAN TIMBER COMPANY, INC., MONTEVALLO, ALABAMA**

The Seaman Timber Company, Inc. (Standard Industrial Classification 2491) of Montevallo, Alabama was surveyed on July 26, 1979 to provide information on current and past processes used at the company, to review occupational safety and health procedures, to determine exposure concentrations of creosote (8001589) during routine wood treatment, to determine the need for comprehensive field studies to evaluate long term health effects associated with pressure treating of wood with creosote and chromated copper arsenate (7778418) (CCA), and to collect information for future technical reports. The company employs about 100 workers; 8 of these are actively engaged in wood treating. The company had no formal preemployment or periodical medical evaluation program for wood treatment employees but there was an initial employee orientation on good work practices, safety rules, and precautions, and periodic safety meetings. Two area air samples were taken near bundles of wood that had been unloaded from the processing cylinders after the creosote and coal tar (8007452) treatment, but no valid results were obtained. The authors conclude that inconsistencies in the laboratory procedure, compared with the NIOSH recommendations for evaluating airborne concentrations of creosote, resulted in poor analytical sensitivity, and inaccurate and invalid results.

Todd, AS Timbie, CY  
Stewart-Todd Associates, Incorporated, National Institute for Occupational Safety & Health Nov. 1979, 16p

Contract PHS-210-78-0060

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-186208

10 318313

**INDUSTRIAL HYGIENE REPORT: PRELIMINARY SURVEY OF WOOD PRESERVATIVE TREATMENT FACILITY AT PERMAPOST PRODUCTS COMPANY, HILLSBORO, OREGON**

The Permapost Products Company of Hillsboro, Oregon was surveyed on June 25, 1979 to provide information on current and past process methods and materials used for treating wood products (Standard Industrial Classification 2491), to review occupational safety and health procedures, determine exposure concentrations of pentachlorophenol (87865) (PCP), and collect information for future technical reports. Twenty employees were involved in the wood preserving processes which include treatment by copper-8-quinolinolate (10380286), chromated copper arsenate (37337136) (CCA), and PCP. The company had no formalized medical monitoring on industrial hygiene programs although annual audiometric tests were given and exposure was controlled through work practices, processing methods, and protective equipment. Both the NIOSH and silica gel methods for air monitoring revealed that airborne PCP concentrations were below the limit of detection inside the treatment building. Samples taken on top of the hot wood bundles removed from the treatment cylinder indicated that PCP concentrations were below 0.26 milligrams per cubic meter (mg/cu m).

Samples taken at a site near the cylinder when its door was opened indicated PCP concentrations of 0.51mg/cu m by the NIOSH method and 0.20mg/cu m by the silica gel method. The authors conclude that a comparative evaluation of the two monitoring methods cannot be made due to the small number of samples taken, and that three of the six samples had concentration below detection limits.

Todd, AS Timbie, CY  
Stewart-Todd Associates, Incorporated, National Institute for Occupational Safety & Hlth Aug. 1979, 21p

Contract PHS-210-78-0060

ACKNOWLEDGMENT: NTIS  
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PB80-186661

#### 10 318314

##### **PRELIMINARY SURVEY OF WOOD PRESERVATIVE PRODUCTION FACILITY AT KOPPERS COMPANY, INC., FOREST PRODUCTS GROUP, SPECIALTY WOOD CHEMICALS DIVISION, VALPARAISO, INDIANA**

The Koppers Company, Incorporated, a chromated copper arsenate manufacturing facility (Standard Industrial Classification 2851) in Valparaiso, Indiana was surveyed on July 24, 1979 to evaluate work practices, exposure controls, past exposures, and medical, industrial hygiene, and safety programs. The facility employs five workers. Two NIOSH sampling methods were used to measure arsenic (7440382), chromium (7440473), and copper (7440508) at two sites for 5 hours at each site. The company provided a comprehensive medical surveillance program, periodic air sampling and exhaust system maintenance, and mandatory protective clothing and showers. Airborne levels recorded were 19.0 and 135.2 micrograms per cubic meter (cu m) for copper, 4.2 and 22.2 micrograms/cu m for total chromium, 1.1 and 15.2 micrograms/cu m for hexavalent chromium, and 4.2 and 24.2 micrograms/cu m for arsenic. The authors suggest that arsenic exposure exceeded the OSHA permissible exposure limit of 10 micrograms/cu m averaged over an 8 hour period. The OSHA permissible exposure limits of 1 milligram per cubic meter (mg/cu m) averaged over an 8 hour period for copper dust and mists and 0.5 mg/cu m for chromic acid were not exceeded.

Todd, AS Timbie, CY  
Stewart-Todd Associates, Incorporated, National Institute for Occupational Safety & Hlth Feb. 1980, 13p

Contract PHS-210-78-0060

ACKNOWLEDGMENT: NTIS  
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PB80-186679

#### 10 318315

##### **INDUSTRIAL HYGIENE REPORT: PRELIMINARY SURVEY OF WOOD PRESERVATIVE TREATMENT FACILITY AT MISSOURI WOOD TREATING COMPANY, RAYMONDSVILLE, MISSOURI**

The Missouri Wood Treating Company (Standard Industrial Classification 2491) of Raymondsville, Missouri was surveyed on July 11, 1979 to provide information on the company's current and past process methods, review occupational safety and health procedures, determine exposure concentrations of pentachlorophenol (87865) (PCP) during routine treatment processes, assess air sampling methods, and collect information for future criteria documentation or technical reports on the wood preservative industry. Six employees had potential routine exposure to the PCP in light oil which is used in a vacuum impregnation process to preserve soft and hard wood lumber. The company had no formal medical surveillance, industrial hygiene, or safety program for its employees at the time of the survey. Safety equipment was limited primarily to leather gloves used for handling treated lumber. Company management reported no history of medical problems arising from the work process. Area air monitoring performed with the NIOSH impinger method indicated airborne PCP concentrations of 0.13 to 0.25 milligrams per cubic meter (mg/cu m). Analysis by the silica gel absorption method indicated that all PCP concentrations were below 0.09mg/cu m. The authors conclude that the two sampling procedures provided significantly different results, which suggested a poor correlation between procedures. However, too few samples were collected to evaluate the difference adequately.

Todd, AS Timbie, CY  
Stewart-Todd Associates, Incorporated, National Institute for Occupational Safety & Hlth Sept. 1979, 16p

Contract PHS-210-78-0060

ACKNOWLEDGMENT: NTIS  
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PB80-187099

#### 10 318373

##### **CHEMICAL ANALYSIS OF PAH IN DIESEL EXHAUST GASES**

Four different diesel fuels were used in these tests. Besides polycyclic aromatic hydrocarbons (PAH), the content of CO, CO sub 2, HC and NO/sub x/ in the exhaust gases was also measured. It was found that the lighter fuels gave a lower PAH content in the exhaust and that a catalytic converter, working at proper temperature, efficiently eliminated PAH.

U.S. Sales Only.

Rehnberg, O Nilsson, E Christiansson, J  
Lulea University, Sweden May 1979, 63p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

TULEA-1979-14-T

#### 10 318715

##### **STANDARDS SUPPORT AND ENVIRONMENTAL IMPACT STATEMENT. VOLUME 1: PROPOSED STANDARDS OF PERFORMANCE FOR GRAIN ELEVATOR INDUSTRY**

Standards of performance to control particulate matter emissions from new and modified grain elevators in the U.S. are being proposed under section 111 of the Clean Air Act. The proposed standards limit emissions of particulate matter from the following affected facilities and their air pollution control devices: truck loading and unloading stations, railroad hopper car and boxcar loading and unloading stations, equipment at barge and ship unloading stations, barge and ship loading stations, all grain handling operations, and grain dryers. This document contains information on the grain elevator industry and emission control technology, a discussion of the selected emission limitations and the supporting data, and the alternatives which were considered, and analyses of the environmental and economic impacts of the proposed standards.

Environmental Protection Agency EPA-450/2-77-001A, Jan. 1977, 348p

ACKNOWLEDGMENT: NTIS  
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PB80-194152

#### 10 318960

##### **NOISE CONTROL FOR RAPID TRANSIT CARS ON ELEVATED STRUCTURES: PRELIMINARY INVESTIGATION OF VEHICLE SKIRTS, UNDERCAR ABSORPTION, AND NOISE BARRIERS**

In the report, procedures to reduce the propulsion system noise of urban rail transit vehicles on elevated structures are studied. Experiments in a laboratory use a scale model transit vehicle to evaluate the acoustical effectiveness of noise barrier walls, vehicle skirts, and undercar absorption. These experiments assume that the propulsion system noise is the only source of noise. Field measurement of urban rail transit vehicles at the Port Authority Transit Corporation (PATCO) in New Jersey provide additional data to compare the noise from elevated-structure and at-grade track sections. The results show that vehicle skirts and undercar absorption can provide a cost-effective noise reduction alternative to noise barriers if the propulsion system is the dominant noise source. The scale model results are only approximate and must be verified by full-scale demonstration tests. However, the potential value of the results can be demonstrated by applying the measured noise reductions in octave bands to the actual measured noise spectrum of the PATCO vehicle.

Hanson, CE Schafer, M Towers, D Eldred, K  
Bolt, Beranek and Newman, Incorporated, Transportation Systems Center, Urban Mass Transportation Administration. Final Rpt. UM-TA-MA-06-0099-80-4, Apr. 1980, 61p

Contract DOT-TSC-16611

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-213077



10 319637

**VIBRATION AND STRUCTURE-BORNE SOUND IN THE VICINITY OF ROAD TUNNELS**

The results of measuring the vibration and structure-borne sound in the vicinity of a large motorway tunnel are presented including measurements during the construction of the tunnel.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Koch, HW (Hannover University, West Germany) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 381-388, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 319644

**DIESEL EMISSIONS AND THE AMES TEST: A COMMENTARY**

Particulates emitted from diesel engines contain substances which produce mutations in the bacterial assay known as the B. N. Ames Salmonella/microsome test. The limitations and value of the Ames test data are discussed.

Wei, ET (California University, Berkeley); Wang, YY Rappaport, SM *Air Pollution Control Association, Journal of* Vol. 30 No. 3, Mar. 1980, pp 267-271, 26 Ref.

ACKNOWLEDGMENT: EI

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10 319648

**RETROFIT NOISE CONTROL OF RAPID TRANSIT CARS**

Describes a retrofit noise control study for existing, electric-powered transit cars currently operated by the New York City Transit Authority. The study focused on a test car considered to be representative of the fleet, that was outfitted with monitoring equipment and operated through a series of experiments. The dominant noise-producing components were determined and the important noise and vibration transmission paths located. Simple, easy-to-implement treatments that would reduce the noise levels to acceptable levels were recommended. Some of the recommendations included better side-door and end-door seals, increased floor mass, and quieted traction motor fans.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Remington, PJ (Bolt, Beranek and Newman, Incorporated); Wittig, LE *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 419-441, 18 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

10 319652

**NOISE GENERATION BY RAILROAD COACHES**

A systematic analysis was carried out on the acoustic behavior of railroad coaches. Radiation of air-borne sound as well as structure-borne sound transmission from the wheel/rail contact area to the car body was investigated in laboratory and stationary tests and during test runs at high speeds (160-250 km/h). The aim of the experiments was to find out how much the individual components of the trailing bogie contribute to the transmission of structure-borne sound and the radiation of air-borne sound. A rank ordering of the individual transmission paths from the axle bearing to the bogie frame was set up. An identification of the main noise sources and an indication of the frequency range in which they are important was possible.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Fischer, HM (Technical University of Berlin, West Germany) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 333-349, 14 Ref.

ACKNOWLEDGMENT: EI

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10 319653

**GROUND VIBRATIONS FROM PASSING TRAINS**

The residual problems of ground-borne vibration, the vehicle and track features which might be responsible for generation, its propagation, and its

effects on wayside buildings are examined. Experimental work suggested various significant features of railway design which might merit attention.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Dawn, TM (British Railways Board); Stanworth, CG *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 355-362, 7 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

10 319654

**GROUND-BORNE NOISE AND VIBRATION FROM UNDERGROUND RAIL SYSTEMS**

Ground-borne noise is one of the main causes of environmental impact from urban rail transit systems. The vibration resulting from track-train interaction is transmitted through the tunnel structure and the surrounding ground to adjacent buildings. The resulting vibrations of the walls and floors of these buildings cause secondary radiation of noise. This paper presents a method for estimating A-weighted sound levels as well as noise and vibration spectra due to ground-transmitted vibration in buildings near subways.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Kurzweil, LG (Department of Transportation) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 363-370, 24 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

10 319655

**COMPARATIVE VALUES OF STRUCTURE-BORNE SOUND LEVELS IN TRACK TUNNELS**

Comparative figures for the structure-borne sound levels in underground train tunnels are given by the results of measurements made by the Curt-Risch-Institut as published in a series of internal reports.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Koch, HW (Hannover University, West Germany) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 377-380, 4 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

10 319656

**PROPAGATION OF NOISE FROM RAIL LINES**

The author presents models for predicting the effects of geometric attenuation, air absorption, ground attenuation, and barrier insertion loss on the propagation of noise from railcars and locomotives. Predictions based on these models are compared with available field data.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Kurzweil, LG (Department of Transportation); Cobb, WN Kendig, RP *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 389-405, 30 Ref.

ACKNOWLEDGMENT: EI

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10 319657

**PILOT STUDY ON RAILWAY NOISE ATTENUATION BY BELTS OF TREES**

A pilot study was carried out to obtain an indication of the order of magnitude of attenuation of noise from passing trains by belts of trees and bushes 25 to 50 m wide. Pass-by noise was recorded in level grass-covered country and behind a belt of trees and bushes close by at two measurement sites.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Kragh, J *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 407-415

ACKNOWLEDGMENT: EI

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DOTL JC

10 319658

**RAILWAY NOISE AND VIBRATION ANNOYANCE IN RESIDENTIAL AREAS**

The 1975/76 I. S. V. R. national study of railway noise in Great Britain combined a noise measurement program and a social survey of the reactions to railway noise of residents within an estimated 65 dB(A) (peak) railway noise contour. A complex probability sample of 2010 addresses grouped in sets of 5 adjacent addresses within 403 compact segments in 75 areas each approximately one mile long was utilized in the study. Each of the 403 clusters of dwelling units became a physical noise measurement site. The results indicate that through train noise, maintenance noise and vibration are the most widely noticed problems associated with railways in residential areas.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Fields, JM (Southampton University, England) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 445-458, 17 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319659

**RAILWAY TRAFFIC: ENVIRONMENTAL NOISE CONTROLS FOR NEW HOUSING SITES**

The absence of an established criterion for housing site design against railway noise presents problems for environmental health officers who are consulted at the planning stage of housing sites. A guidance standard is suggested and experiences of a recent housing development are described.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Clegg, JD (Environmental Health Department, England) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 463-467, 10 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319660

**MEASUREMENTS OF NOISE FROM HIGH SPEED ELECTRIC TRAINS IN THE UNITED STATES NORTHEAST RAILROAD CORRIDOR**

Noise measurements taken during service evaluation tests on a high speed section of AMTRAK's Northeast Corridor (NEC) are presented.

Proceedings of the Workshop on Railway and Tracked System Noise, 2nd, Lyon, France, October 17-19, 1978.

Hanson, CE (Bolt, Beranek and Newman, Incorporated) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 469-471

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319661

**ENVIRONMENTAL NOISE IMPACT ASSESSMENT OF THE INTRODUCTION OF HIGH SPEED TRAINS IN THE NORTHEAST CORRIDOR**

The Northeast Corridor Improvement Program (NECIP) which affects eight states and the District of Columbia, serves the most heavily urbanized section of the country and passes through some of the nation's largest cities and some of the most environmentally sensitive areas, including a number of sites on the National Register of Historic Places. Assessment of the overall effects of the NECIP is provided by a Programmatic Environmental Impact Statement (PEIS) to indicate whether or not the NECIP will spawn a massive public outcry against noise on a systemwide basis. The PEIS also identifies types of locations throughout the Corridor that may have noise problems. Site Specific Environmental Impact Statements (SEIS) provide assessment of environmental problems in specific locations. In a SEIS, a location where noise is expected to be a significant problem is assessed in detail, with noise controls designed to minimize impact. Specific noise controls are described in a mitigation chapter.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Hanson, CE (Bolt, Beranek and Newman, Incorporated) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 473-476, 3 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319662

**OVERALL RAILWAY NOISE IMPACT IN THE U. K.**

As part of a British Rail (BR) "Environmental and Social Impact" study in 1975, an attempt at assessing the relative noise impact of rail and road transport was made; 24 hour L//e//q in dB(A) units was adopted for the noise measure, as this appeared to give good correlation with "dissatisfaction" and permitted simple estimation of levels from traffic and location data. Five train types were defined, two classes of line, three regions of population density and three standard topographies. The base L//e//q value for each traffic mix, line and population region could be established from BR survey data, and the propagation from topography and population (house) densities, to give the population subjected to each L//e//q. The percentage "dissatisfied" at each L//e//q was then applied to arrive at the total population "dissatisfied", which was found to be 106,000. A similar approach applied to motorways and principal "A" roads gave 4,480,000 "dissatisfied".

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Waters, DM (Loughborough University of Technology, England) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 477-481, 8 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319663

**IMPORTANCE OF RAILWAY NOISE IN FRANCE**

A national survey on environmental nuisances due to all forms of transport was made in France during 1977. From among the data gathered, it is possible to extract results concerning the impact of nuisance due to railways, partly from results of questionnaires and partly from results of acoustical measurements. Interviews and measurements were made in several towns, at randomly selected dwellings. Rail and air transport noise nuisance impacts appeared to be of comparable importance, with that of road transport very much larger than either.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Maurin, M (Institute of Transport Research) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 493-496

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319664

**DUTCH STUDY ON RAILROAD TRAFFIC NOISE**

A Dutch study on the community response to noise is presented. The set-up of the study is described broadly. Some details are given about the comprehensive sound level measurement program. Some preliminary results from the social survey are given. A major finding is that annoyance is caused less by the sound of trains running through than by other sounds from the track.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Jong, RG de *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 497-502, 2 Ref.

ACKNOWLEDGMENT: EI  
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10 319676

**EFFECT OF TRAIN NOISE ON SLEEP FOR PEOPLE LIVING IN HOUSES BORDERING THE RAILWAY LINE**

Disturbance of sleep by train and road noises was studied through in situ physiological recordings. For the same value of L//e//q three times as many disturbances due to the noise from road traffic were found as there were due to the train noise. The data on sleep reactions for all the noise events does not show a better train noise adaptation than that for the road noise.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

Vernet, M (Institute of Transport Research) *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 483-492, 8 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319677

#### ON THE SOURCES OF WAYSIDE NOISE GENERATED BY HIGH-SPEED TRAINS

A linear array of 14 microphones was used to measure radiated noise generated by a four-carriage electric train traveling at speeds between 160 and 250 km/h. Most of the results given pertain to apparent source locations of wheel/rail interaction noise, although preliminary data collected in a concurrent study of railway aerodynamic noise are briefly mentioned. An analysis of the measurements suggests that apparent sources of wheel/rail interaction noise are located (i) in the rail or substructure at low frequencies, (ii) on the wheel rim just below the axle at intermediate or peak frequencies, and (iii) on the lower part of the wheel and possibly in the rail at high frequencies.

Proceedings of the Workshop on Railways and Tracked Transit System Noise, 2nd, Lyon, France, October 17-19, 1978.

King, WF, II Bechert, D *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 311-332, 37 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

10 319678

#### PREDICTION OF THE PROPAGATION OF TRAIN-INDUCED GROUND VIBRATION

The author presents models for prediction of the propagation of train-induced ground vibration. Three models are presented: the line source model, the point source model and the superposed model, and each of these models is discussed in regard to available measurement data.

Proceedings of the Workshop on Railway and Tracked Transit System Noise, 2nd Lyon, France, October 17-19, 1978.

Verhas, HP *Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 371-376, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

10 319679

#### PROCEEDINGS OF THE WORKSHOP ON RAILWAY AND TRACKED TRANSIT SYSTEM NOISE, 2ND, 1978

Twenty papers by various authors deal with railway and tracked transit system noise. Major topics covered are: sources and mechanisms of noise generation--its control and parameters influencing the noise; other sources, including maintenance noise, freight yards, locomotive noise, station noise; sources and propagation of vibration; propagation of railway noise--barriers and effects of topography; vehicle interior noise--sources and comfort; and, community response to noise--criteria effect on sleep. All papers are abstracted.

Workshop held October 17-19, 1978.

*Journal of Sound and Vibration* Vol. 66 No. 3, Oct. 1979, pp 295-506

ACKNOWLEDGMENT: EI  
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DOTL JC

10 322564

#### SOUND INSULATING STEEL STRUCTURES IN BRIDGE CONSTRUCTION- PRINCIPLES AND FIRST APPLICATION [Schallgedaempfte Stahlkonstruktionen im Brueckenbau- Grundlagen und erste Anwendung]

The authors deal with the problem of decreasing noise on steel railway bridges by incorporating three-layered bonded steel and plastic systems over a large area; these lead to a considerable decrease in the radiation of noise since they reduce vibration noise. The action of these bonded systems is discussed with reference to the specific requirements of the bridge, such as fixing of the bonded system to the steel structure, corrosion behaviour in the region of the bond and long term behaviour of the system under the action of mechanical loading and temperature. Full scale tests were carried out on

two steel box girder railway bridges. The bonding system was mounted in two sections; the noise-reducing plastic was a vinyl acetate copolymer on bridge 1 and a 2-component polyurethane-based material on bridge 2. Results are described. [German]

Hanel, JJ Seeger, T  
Technical University of Darmstadt, West Germany Monograph No. 32, 1978, 166p, 107 Fig., 12 Tab., 14 Phot., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 311687), Federal Institute of Road Research, West Germany

ORDER FROM: Technical University of Darmstadt, West Germany, Institut fuer Statik und Stahlbau, Alexanderstrasse 7, 61 Darmstadt, West Germany

10 322845

#### FUEL EFFECTS ON DIESEL ODOR IN A SPRAY BURNER

A laboratory burner has been operated with paraffinic mixtures, aromatic mixtures, n-paraffins, cetane standard fuel mixtures, and diesel No. 2 to measure fuel effects upon the production of diesel odor. Of the variables studied which included aromatic content, volatility, cetane number and specific gravity, only aromatic content was found to have a significant effect upon measured odor intensity.

For Meeting held February 25-29, 1980.

Hsieh, FT (Drexel University); Cernansky, NP Savery, CW *Society of Automotive Engineers Preprints* SAE 800425, 1980, 8p, 17 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 322933

#### USING SOUND PROOFING WALLS TO ATTENUATE RAILWAY NOISE [Schienenverkehrsgeraeusche und ihre Minderung durch Schallschutzwaeende]

Evaluation of the noise attenuation effect of 7 types of sound-proofing walls on a 4 track railway line. [German]

Hoelzl, G Hafner, P *Zeitschrift fuer Laermbeakaempfung* Vol. 27 No. 3, 1980, pp 92-99, 14 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Zeitschrift fuer Laermbeakaempfung, Berlin, West Germany

10 322973

#### PREDICTION OF COMMUNITY NOISE FROM RAIL SYSTEMS

This paper presents a simple procedure for predicting noise in the vicinity of rail lines including intercity freight and passenger services and metropolitan systems. The procedure accounts for the effects of speed; wheel and rail condition; travel on bridges and elevated transit structures; geometrical spreading of sound energy; excess attenuation due to propagation over the ground and through the air; and barrier attenuation by sound screens, cuttings, embankments, and houses. A-weighted sound pressure level is the basic quantity predicted; equations are given to determine various noise exposure measures such as the 24-hour energy equivalent sound level, the day-night average sound level and the community noise equivalent level.

ASTM Special Technical Publication n 692, Community Noise (Symposium), Kansas City, Missouri, May 24-26, 1978.

Kurzweil, LG (Department of Energy)  
American Society for Testing and Materials 1979, pp 197-216, 40 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103

10 322978

#### RAILROAD NOISE IMPACT ON RESIDENTIAL LAND PLANNING

A method of test for residential land use in the vicinity of a railroad using on-site noise level measurements is described. This was applied in the Columbus, Ohio area to optimize residential land utilization in the vicinity of a cross-country railroad. Acceptability criteria are those expressed in the Department of Housing and Urban Development Circular 1390.2 and a criterion developed for this special case. Measurement variables include the peak A-weighted sound pressure level, the energy equivalent sound level, the day-night average sound level, train passage frequency and distance from the railroad's right-of-way centerline.

ASTM Special Technical Publication n 692, Community Noise (Symposium), Kansas City, Missouri, May 24-26, 1978.



Campanella, AJ  
American Society for Testing and Materials 1979, pp 276-287, 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103

10 323347

**ENVIRONMENTAL IMPACT STATEMENT FOR FINAL INTERSTATE RAIL CARRIER NOISE EMISSION REGULATION: SOURCE STANDARDS**

This Environmental Impact Statement addresses the final noise emission regulation for railroad activities, other than line-haul operations. In arriving at the final regulation, the Environmental Protection Agency carried out detailed investigations of railroad yard operations, noise sources, noise measurement methodologies, available noise control technology, costs attendant to noise control methods, possible economic impacts, and the potential environmental and health and welfare benefits associated with the application of various noise control measures. Data and information were generated as a result of these investigations. Summaries are presented herein of the more pertinent information regarding the environmental impacts expected to result from the regulatory action.

Environmental Protection Agency EPA 550/9-79-211, Dec. 1979, 6p, 1 Tab.

ORDER FROM: Environmental Protection Agency, Office of Noise Abatement and Control, 1921 Jeff Davis Hwy, Arlington, Virginia, 20460

DOTL RP

10 324403

**NOISE-DAMPED WHEELS FOR LONG-DISTANCE RAIL TRAFFIC**

The author describes the measurement and analysis of the natural vibrations of wheels, and development of resonance absorbers to dampen wheel vibrations responsible for noise. Design, construction and use of absorber-damped wheels on Inter-City trains on German Federal Railroads is shown to reduce noise, proved in running tests, at up to 250 km/h.

Raquet, E. *Rail Engineering International* Vol. 9 No. 1, Jan. 1980, pp 13-14, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 324417

**OPEN FLAME STUDIES CONTRIBUTE TO UNDERSTANDING OF DIESEL SMOKE**

When combustion duration in a direct injection diesel engine cylinder was measured using a flame luminosity detector, smoke level was found to increase as combustion extended beyond exhaust valve opening. Parallel studies of continuous-spray diffusion flame indicate that maximum temperature location corresponds with a region of minimum soot, rather than maximum. Soot formation and oxidation with increasing crank angle following initiation of combustion are similar to those along the axis of an open flame—thus providing a powerful tool for studying exhaust smoke without in-cylinder constraints and complexities.

*Automotive Engineering* Vol. 88 No. 4, Apr. 1980, pp 46-52

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 324422

**ANALYSIS OF PISTON SLAP-INDUCED NOISE AND ASSESSMENT OF SOME METHODS OF CONTROL IN DIESEL ENGINES**

In diesel engines combustion-optimized for fuel consumption or emissions, mechanically induced noise tends to control the overall engine noise level, with that due to piston slap being predominant. Previous studies, mainly experimental, have helped to clarify the mechanism of the piston slap phenomenon and have suggested methods of control. This paper presents the latest results of a theoretical analysis of the piston slap dynamics which yields predictions of some optimum piston design features for low piston slap-induced noise related to the estimated mechanical efficiency of the engine.

For Meeting held February 25-29, 1980.

Haddad, SD (Loughborough University of Technology, England);

Howard, DA *Society of Automotive Engineers Preprints* SAE 800517, 1980, n.p., 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

10 324423

**MEASUREMENTS AND DIAGNOSIS OF DIESEL ELECTRIC LOCOMOTIVE NOISE**

The article describes the measurement methods of noise generated by an SD40-2 diesel electric locomotive under a number of operating conditions, in idle and eight throttle settings.

Remington, PJ (Bolt, Beranek and Newman, Incorporated); Rudd, MJ Mason, R *Noise Control Engineering* Vol. 14 No. 2, Mar. 1980, pp 66-73, 7 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 324917

**ACTIVE PROTECTIVE MEASURES AGAINST NOISE AT HIGH SPEEDS IN THE WHEEL/RAIL SYSTEM [Aktive Laermassnahmen bei hohen Geschwindigkeiten der Rad/Schiene-Technik]**

No Abstract. [German]

Report on Research Project TV 7632 "Rapid Guided Transport using the wheel/rail system" of the German Federal Ministry of Research and Technology.

Hoelzl, G Schreiner, K

German Federal Railway DB: Dok 5222, 1979, 23p, 3 Tab., 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: German Federal Railway, Arnulfstrasse 19, 8 Munich, West Germany

10 325284

**TUNNELS FOR HIGH-SPEED TRAINS**

With high speed trains now reaching speeds of well over 200 kph, problems arise over the pressure waves they generate in tunnels, with possible discomfort to passengers and, through sonic booms, annoying people who live nearby. To slow the trains at tunnels means losing money on capital investment. One costly solution is to drive bigger tunnels. An alternative, and cheaper approach, supported by British Rail is to find ways of modifying existing tunnels.

Vardy, AE (Dundee University, Scotland); Fox, JA (Leeds University, England) *Hong Kong Engineer* Oct. 1980, pp 29-31, 6 Fig.

ORDER FROM: Asia Trade Journals Limited, 7th Floor, Sincere Insurance Building, 4-6 Hennessy Road, Hong Kong, Hong Kong

10 325285

**URBAN RAIL NOISE ABATEMENT PROGRAM DIGEST**

Transit operators, transit patrons and communities have all expressed concern over rail transit noise and indicated that its reduction should have priority. The UMTA Urban Rail Noise Abatement Program has assessed the dimensions of this problem to identify, develop and test noise abatement technology, and to share such control techniques with transit systems, suppliers, manufacturers and others concerned with urban rail noise. The Program consists of three major areas: Noise Assessment in which the mechanics of noise transmission and methods of acoustic measurement are described; Technology Development and Evaluation in which the various types of wheel/rail noise are described along with damping systems, as well as the problems of elevated structures, subway tunnel vibration, ground-borne noise and propulsion system noise.

Urban Mass Transportation Administration UMTA-MA-06-0099-80-3, May 1980, 37p, 14 Fig., Photos.

ORDER FROM: NTIS

DOTL RP

10 325740

**ASSESSMENT OF LOCOMOTIVE CREW IN-CAB OCCUPATIONAL NOISE EXPOSURE**

The railroad industry, unlike most other U.S. industries, is not subject to the safety regulations of the Occupational Safety and Health Administration.

Instead, railroad workers are covered by the safety regulations of the Federal Railroad Administration (FRA). This report documents an extensive study designed to assess the noise environment in locomotive cabs. Operational duty cycle and in-cab sound level data are presented for 18 test runs made on 16 different locomotives used in wide range of operational modes (e.g., through freight and local transfer freights), varied terrains (mountainous, undulating and flat) and varied trip lengths (6 to 12 hours). The general conclusion of this study is that there does not appear to be a widespread problem of overexposure to noise based on the same type of evaluation as currently used by OSHA (only 1 out of 18 test runs exceeded the criteria). The noise exposure is within acceptable limits because the operational duty cycle is such that the sources which generate high sound levels (horn and brake) are operating only for short periods of time and because the locomotive spends a great deal of time idle (diesel engine sound levels below 90 dB). However, there was one test run for which an overexposure to noise was measured. To pinpoint such cases where overexposure to noise may occur, a simplified testing procedure is developed. This test consists of making in-cab sound level measurements of engine notch 8 (no load), horn sounding and brake application with the locomotive stationary. With these three sound level measurements and an estimate of the time that the locomotive is operating on-line, the in-service noise dose can be estimated and a pass/fail assessment made of whether the noise exposure might exceed acceptable limits.

Kilmer, RD

National Bureau of Standards, Federal Railroad Administration Final Rpt. FRA/ORD-80/91, Dec. 1980, 83p, 21 Fig., 57 Tab., 39 Ref., 1 App.

ORDER FROM: NTIS

PB81-154395, DOTL NTIS, DOTL RP

10 325889

#### MODEL FOR THE INFORMATION OF EMISSIONS IN A DIRECT-INJECTION DIESEL ENGINE

A mathematical model of diesel spray combustion in direct-injection diesel engines is described. The model is based on concepts of quasi-homogeneous multiple-zone combustion. The paper illustrates the use of the model in a fundamental study of the effect of high injection pressure on the combustion and pollutant-formation process. A fundamental tradeoff between cycle work and nitric oxide results when fuel-air mixing rate is used as a controlling parameter.

Combustion Model in Reciprocating Engines, Symposium, GM Research Laboratory, Warren, Michigan, November 6-7, 1978.

Shahed, SM Flynn, PF Lyn, WT

Plenum Press 1980, pp 345-368, 23 Ref.

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

10 325899

#### OPTOACOUSTIC MEASUREMENTS OF DIESEL PARTICULATE EMISSIONS

Infrared absorption by acetylene and diesel smoke particles as measured using a differential optoacoustic cell driven by a 3.4 W CO sub 2 laser. Real-time particle mass concentration measurements are presented. The average particle extinction cross sections per unit mass of acetylene and diesel smoke are obtained.

Faxvog, FR (General Motors Corporation); Roessler, DM *Journal of Applied Physics* Vol. 50 No. 12, Dec. 1979, p 7880, 9 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

10 325910

#### PROPOSED DIRECTIVE CONCERNING THE EVALUATION OF EFFECTS OF CERTAIN PUBLIC AND PRIVATE WORKS ON THE ENVIRONMENT [Proposition de directive concernant l'évaluation des incidences sur l'environnement de certains ouvrages publics et privés]

This proposal concerns the introduction, in legislation and administrative practice of Member States, of a number of common principles for before-the-event evaluation of the impact on the environment of public and private works likely to affect the environment and living conditions. Construction projects mentioned in the proposal include motorways, intercity railway lines (including high-speed lines), city-to-airport links, commercial ports, inland waterways, and pipelines. [French]

Commission of the European Communities SNCF Cat. 10 0 1, June 1980, 34p, 3 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Commission of the European Communities, 200 rue de la Loi, B-1040 Brussels, Belgium

10 329515

#### TRANSPORTATION NOISE

This paper traces the genesis of Ontario noise policies and guidelines and discusses the assessment and training techniques developed over the past five years by the Noise Pollution Control Section and others in meeting environmental noise control objectives in the Province of Ontario.

Cumpridium Technical Papers Annual Meeting of the Institute of Transportation Engineers, 49th, Toronto, Ontario, September 23-27, 1979.

Manuel, J

Institute of Transportation Engineers Conf Paper 1979, p 127, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

10 329525

#### FORMAL EVALUATION OF LARGE AND SMALL POWER STATIONS IN SOUTHEASTERN UTAH

Environmental impacts from large and small power plants are explained. Of particular interest are the social and economic changes in the small towns likely to experience "boom-town" growth during plant construction; the health and safety effects arising from coal mining, transportation, and combustion; the effect of transferring water from irrigated agriculture to power plant cooling; and the effect of plant operation on the atmospheric visibility in the nearby national parks. Multi-attribute utility measurement is used to provide a formal evaluation of the diverse set of impacts arising from large and small power plants. Value information obtained from a workshop with eight residents of the region is used to determine which of the many impacts appears most crucial to the comparison of large versus small plants.

Ford, A (Los Alamos Scientific Laboratory); Champion, D Gardiner, P *Energy Systems and Policy* Vol. 4 No. 1-2, 1980, pp 125-155, 20 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 329945

#### AN EXPERIMENTAL STUDY OF THE RAIL VIBRATION CHARACTERISTICS IN VARIOUS TRACKS

To develop measures for decreasing the noise and vibration of the Shinkansen high-speed lines, various track structures were laid on the Tohoku experimental line. The fundamentals of rail vibration and specific characteristics of six track sections are appraised. Each test rail was struck by a hammer and its vibration analyzed. General conclusions are drawn.

Hirata, G *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 123-126, 4 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

10 329951

#### DISPOSAL OF EFFLUENTS FROM RAILWAY WORKS

The nature and composition of effluents from railways works varies depending on the requirements and the necessary work processes. Legislation lays down minimum requirements for the purity of effluents discharged. The treatment of effluents is subdivided into process stages for which various technical possibilities exist. The use of the techniques possible depends among other things on the energy resources and the state of technical development. Preliminary measures for improving the effluent situation are adopted before new plant is constructed. The proper functioning of effluent cleaning plants is checked at frequent intervals. [German]

Boeck, E *Eisenbahntechnische Rundschau* Vol. 29 No. 9, Sept. 1980, p 627

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

10 329959

**LIMITING RAIL TRAFFIC NOISE: LEGISLATIVE TRENDS AND THE TECHNICAL POSSIBILITIES**

The author describes the difficulties which would face rail transport as a result of proposed legislation to reduce noise levels. Whereas the reduction of sound emission is mainly a question of finance and as such could be met by state assistance, the parallel proposal to limit the noise emission of rail vehicles presents largely insoluble technical problems at the present time, and this could be an obstacle to the future development of rail transport. Such a situation must be avoided wherever possible since the railways in particular are an environmentally desirable mode of transport. This applies not only to such aspects as exhaust emission, energy consumption and traffic safety, but also to performance-related noise emission. [German]

Hauck, G *Eisenbahntechnische Rundschau* Vol. 29 No. 9, Sept. 1980; pp 613-617

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

10 329960

**INVESTIGATIONS INTO REDUCING RAILWAY NOISE BY SHIELDING METHODS ON THE DB AND OTHER EUROPEAN RAILWAYS**

Partly as a result of environmental awareness of the general public, the DB and other European railways have been investigating the effects of anti-noise walls and cuttings on both new and improved railway lines. On the basis of noise measurements obtained, the DB has evolved a calculation procedure which allows an assured forecast of the effect of noise-shielding measures. The measurements carried out by the various European railways on noise-shielding walls have complemented each other rather well. The calculation procedure developed by the DB has shown good agreement between calculated and measured values. Where future anti-noise measures have to be effected on new or improved railway lines because of excessive emission levels, correct dimensioning of the shielding will present no problem. A comparison with noise-shielding measures for road traffic shows that for the same geometric situation the mean level of railway noise will be a few dB(A) better reduced. The reasons for this are the different frequency composition (the higher frequencies of rail traffic noise are more effectively reduced by shielding), and the fact that the noise emitted by rail vehicles is mainly radiated at right angles to the direction of travel (directional characteristics). In addition, this directional radiation means that—in comparison to the situation in road traffic—the shielding does not have to be extended so far beyond the perpendicular drawn from the place of emission to the shielding which means that the length of the shielding can be less. [German]

Hoelzl, G Hafner, P *Eisenbahntechnische Rundschau* Vol. 29 No. 9, Sept. 1980, pp 619-623

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

10 329961

**THE INFLUENCE OF UNDERGROUND RAILWAYS ON THE ENVIRONMENT: EXPERIENCES OF BERLIN'S UNDERGROUND**

Public transport services are called upon to make greater efforts to reduce as far as possible the effects on the environment caused by them. With a measure of financial support from the Federal Ministry of Research and Technology (BMFT), extensive measurements and tests to this end are being carried out by the Berlin Transport Authority (BVG). The first priority is the diminution of the rolling noises caused by wheel and rail action, on the causes of which interesting new knowledge has been obtained. Progress has also been made toward the prevention of screeching noises on tight curves. Other subjects of study are solid-borne noise and vibration in tunnels and the environmental nuisance created by work-shops and pollution. [German]

Irlé, P *Eisenbahntechnische Rundschau* Vol. 29 No. 9, Sept. 1980, pp 641-643

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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10 329968

**UNSTEADY AIR FLOW IN UNDERGROUND RAILWAY TUNNELS [Die Instationäre Luftströmung in U-Bahn-Tunneln]**

The author presents equations for calculating breaks in the air flow in tunnels caused by trains by means of an approximation expression for the speed built up of an underground train from the stationary position. The results of the calculations were checked by measurements and displayed a good level of correlation. [German]

Rohne, E *Schweizerische Bauzeitung* Vol. 95 No. 40, Oct. 1977, pp 705-711, 10 Fig., 14 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 311958), 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

10 329972

**METHODS FOR THE MEASUREMENT OF AIRBORNE SOUND FROM RAILBOUND VEHICLES**

This standard sets out the methods for the measurement of airborne sound for the determination of the A-weighted sound pressure level and of the sound spectrum emitted by all kinds and combinations of vehicles operating on rails or other types of fixed track while in motion and while stationary. Separate sections relate to measuring equipment, quantities to be measured, acoustical environment and meteorological conditions, track conditions, operating conditions for the vehicle during the test, procedure for measurements, and test report.

Standards Association of Australia Monograph NAS 2377-1980, 1980, 8p, 2 Fig., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 239950), Australian Road Research Board

ORDER FROM: Standards Association of Australia, 80 Arthur Street, North Sydney, New South Wales, Australia



11 304630

**PRT (PERSONAL RAPID TRANSIT) IMPACT STUDY. THE PHASE I PRT IMPACT ON MORGANTOWN TRAVEL TRAFFIC AND ASSOCIATED ACTIVITIES**

A new and revolutionary public transportation system, the Morgantown Personal Rapid Transit (PRT) System began regular passenger service operation in Morgantown, West Virginia, in October 1975. This is a study of the impact of Phase I Morgantown PRT, the first fully automated transportation system operational in a city environment. The study was designed to record the effect of the system operation on traffic and associated activities in the areas adjacent to the PRT. The intent of the study was to provide information useful to other areas contemplating the Automated Guideway Transit (AGT) type installations. The PRT system served approximately 38% of the Morgantown residents. During the course of the study, it was concluded that the system was a major force in influencing travel habits, and that residents of the service area used autos for their trips less often than they did prior to the PRT. Compared to the bus system, which it replaced, the PRT is carrying more than the bus's previous share of the total trips.

See also Volume 1, PB-300342, PB-254481, and PB-254483. Also available in set of 3 reports, PB-300340-SET.

Elias, SEG Ward, RE

West Virginia University, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. UMTA-MA-06-0026-79-1, DOT-TSC-UMTA-79-1, July 1979, 88p

Contract DOT-TSC-1316

ACKNOWLEDGMENT: NTIS

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PB-300341/5ST

11 304631

**PRT (PERSONAL RAPID TRANSIT) IMPACT STUDY. OPERATIONAL PHASE. VOLUME I: TRAVEL ANALYSIS**

To study the impact of the Personal Rapid Transit (PRT) on Morgantown, a substantial amount of data was collected in an attempt to capture the state of transportation related conditions before and after passenger service. This report contains an analysis of the latter set of data; namely, that collected in the spring of 1977. The data described in this report, together with those reported in the Pre-PRT Phase, allows assessment of the PRT system impacts on the city of Morgantown. The completed assessment provides other cities considering implementation of AGT systems, sufficiently detailed information to determine whether they can effectively and efficiently utilize a Morgantown type PRT system to satisfy their transportation needs.

See also Volume 2, PB-300341, PB-300343 and report dated Mar 76, PB-254481. Also available in set of 3 reports, PB-300340-SET.

Elias, SEG Ward, RE

West Virginia University, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. UMTA-MA-06-0026-79-2, DOT-TSC-UMTA-79-2, July 1979, 98p

Contract DOT-TSC-1316

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PB-300342/3ST

11 304632

**PRT (PERSONAL RAPID TRANSIT) IMPACT STUDY. OPERATIONAL PHASE. VOLUME II: DATA COLLECTION PROCEDURE AND CODING MANUAL**

The report documents the procedures used by researchers at West Virginia University (WVU) in collecting data which describes transportation-related conditions in Morgantown, West Virginia following the commencement of passenger service on Phase I of the Morgantown Personal Rapid Transit (PRT) System. The record of data collection and data processing decisions given here provides essential documentation for researchers who may be performing subsequent analysis of the data.

See also Volume 1, PB-300342 and report dated March 76, PB-254482. Also available in set in 3 reports, PB-300340-SET.

Elias, SEG Ward, RE

West Virginia University, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. UMTA-MA-06-0026-79-3, DOT-TSC-UMTA-79-3, July 1979, 119p

Contract DOT-TSC-1316

ACKNOWLEDGMENT: NTIS

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PB-300343/1ST

11 314361

**ASSESSMENT OF OPERATIONAL AUTOMATED GUIDEWAY SYSTEMS-AIRTRANS. PHASE II**

This study, Phase II, completes the assessment of AIRTRANS, the automated guideway system located at the Dallas-Fort Worth Airport. The Phase I assessment report: "Assessment of Operational Automated Guideway Systems-AIRTRANS (Phase I)" (PB-261 339), covered concepts, history, technical evaluation, and performance through September, 1976. The work for Phase II was performed between June 1977 and June 1979, and has four main areas of coverage: (1) changes in system configuration including the addition of employee service and the modifications of the failure management and control systems; (2) the availability, reliability, and maintainability history of the system and its components; (3) the operational safety history of the system; and (4) a life cycle cost study of the system. Availability was not defined in the original AIRTRANS specification, and several definitions have been used.

Prepared in cooperation with Department of Transport, Paris (France). See also report on Phase I, PB-261 339.

Watt, CW Elliott, D Dunoye, D Dooley, T Kwok, WS

Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0067) Final Rpt. DOT-TSC-UMTA-79-19, UMTA-MA-06-0067-79-1, Jan. 1980, 338p

ACKNOWLEDGMENT: NTIS

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PB80-182538

11 314371

**AUTOMATED GUIDEWAY TRANSIT SOCIO-ECONOMIC RESEARCH PROGRAM FINDINGS, 1976-1979**

This report summarizes initial findings from the ongoing AGT Socio-Economic Research Program of the UMTA. The program addresses the operational performance, social, economic, environmental, and institutional issues associated with AGT technology to determine where and under what conditions AGT will prove to be a feasible urban public transportation mode. The report includes: (1) a review of empirically-based assessment data on the performance, costs, and public acceptability of operational AGT systems; (2) an analysis of urban AGT feasibility concentrating on AGT ridership potential and associated costs relative to other public transportation modes; (3) an investigation of potential socio-economic and environmental impacts of urban AGT deployment; and (4) an analysis of the nature and magnitude of the potential national market for AGT technology.

Nawrocki, R Zumwalt, BA

Mitre Corporation, Urban Mass Transportation Administration Final Rpt. MTR-79W00351, UMTA-IT-06-0176-80-1, Feb. 1980, 102p

Contract DOT-UT-50016

ACKNOWLEDGMENT: NTIS

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PB80-184633

11 314427

**PHASE I MORGANTOWN PEOPLE MOVER IMPACT EVALUATION**

The Morgantown system belongs to a generic class of systems known as Automated Guideway Transit (AGT). The report presents a summary of the system and service characteristics impacts of the system. The major areas of discussion of this report include an overview of the system and the evaluation effort associated with it, a description of system performance and service characteristics, system ridership, system finances, system impacts, and an identification of experiences that are transferable to other applications of AGT.

Hsiung, S Stearns, MD

Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0026) Final Rpt. DOT-TSC-UMTA-80-9, UMTA-MA-06-0026-80-1, Mar. 1980, 154p

ACKNOWLEDGMENT: NTIS

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PB80-187768

11 314455

**SIMULATION MODELS FOR THE ELECTRIC POWER REQUIREMENTS IN AN AUTOMATED GUIDEWAY TRANSIT SYSTEM**

This report describes a computer simulation model developed at the Transportation Systems Center to study the electrical power distribution characteristics of Automated Guideway Transit (AGT) systems. The objective of this simulation effort is to provide a means for determining the power distribution requirements of AGT systems and for evaluating their performances under varied operating conditions. Typical systems which could be modeled include the Morgantown Personal Rapid Transit System, the Dallas-Fort Worth Airtrans System, or one of the proposed Downtown People Movers. This report specifically describes a Fortran computer program which models the electric power requirements of a typical AGT system.

Williams, GH

Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. DOT-TSC-UMTA-80-2, UMTA-MA-06-0048-80-2, Apr. 1980, 137p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-193386

11 318176

**FACTORS CONTRIBUTING TO THE RETENTION OF SEATED PASSENGERS DURING EMERGENCY STOPS**

In order to examine specific Automated Guideway Transit (AGT) developments and concepts, the Urban Mass Transportation Administration has undertaken a new program of studies and technology investigations known as the Automated Guideway Transit Technology (AGTT) Program. The objective of one segment of this program, the Systems Safety and Passenger Security (SS&PS) study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The prime objective of this deceleration and jerk research study was to provide AGT system planners, designers, and operators with guideline information on the acceleration levels at which seated AGT passengers might be expected to be thrown from their seats during emergency stops. A series of seven experiments was conducted to examine the variables that could contribute to a safe emergency stop on an AGT system. Sixty subjects, conforming to a desired range, experienced emergency decelerations in a test vehicle controlled by an automated braking system. The independent variables examined were seat contour and covering, seat orientation and tilt, footrests and armrests, and rate of change of deceleration (jerk). The dependent variables were the deceleration level at which subjects moved from sensors that were imbedded in the experimental seat and subject ratings.

Jacobs, HH

Dunlap and Associates, Incorporated, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. DOT-TSC-UMTA-79-52, Mar. 1980, 75p

Contract DOT-TSC-1314

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-195134

11 318179

**EVACUATION AND RESCUE IN AUTOMATED GUIDEWAY TRANSIT. VOLUME I: DATA COLLECTION, SCENARIOS, AND EVALUATION**

The objective of one segment of this program, the Systems Safety and Passenger Security (SS&PS) Study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The evacuation and rescue task of the project has as its objective the production of a guidebook detailing the most effective methods and procedures for providing evacuation and rescue in AGT systems. In conventional transportation systems, transportation personnel can help to evacuate and rescue passengers. AGT systems, however, because of their unmanned nature and unique configurations, present a number of problems related to evacuation and rescue. Operation of AGT systems with elevated guideways also present significant problems. Serious injuries and loss of life can result from situations in which inadequate means of evacuating and rescuing passengers exist. The purpose of this portion of the SS&PS program was to identify these problems and where possible, recommend solutions.

This document is Volume I of the final report on evacuation and rescue in AGT, and describes the methodology used in developing evacuation and rescue guidelines.

See also Volume 2, PB80-195779.

Benjamin, DE

Vought Corporation, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. DOT-TSC-UMTA-79-47-I, Dec. 1979, 84p

Contract DOT-TSC-1314

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-195761

11 318180

**EVACUATION AND RESCUE IN AUTOMATED GUIDEWAY TRANSIT. VOLUME II: GUIDEBOOK**

The objective of one segment of the AGTT program, the Systems Safety and Passenger Security (SS&PS) Study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The evacuation and rescue task of the project has as its objective the production of a guidebook detailing the most effective methods and procedures for providing evacuation and rescue in AGT systems. In conventional transportation systems, transportation personnel can help to evacuate and rescue passengers. AGT systems, however, because of their unmanned nature and unique configurations, present a number of problems related to evacuation and rescue. Operation of AGT systems with elevated guideways also present significant problems. Serious injuries and loss of life can result from situations in which inadequate means of evacuating and rescuing passengers exist. The purpose of this portion of the SS&PS program was to identify these problems and where possible, recommend solutions. This Guidebook is Volume II of the final report on evacuation and rescue in AGT and provides guidelines and other information relative to evacuation and rescue of passengers from AGT systems. The report addresses a description of the problems and solutions as they exist on conventional and AGT systems, a discussion of the types of planning that are required to produce satisfactory evacuation and rescue solutions, and recommendations of suitable methods and procedures for AGT evacuation and rescue.

See also Volume 1, PB80-195761.

Benjamin, DE

Vought Corporation, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. DOT-TSC-UMTA-79-47II, Dec. 1979, 97p

Contract DOT-TSC-1314

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-195779

11 318196

**OPERATION OF AUTOMATED GUIDEWAY TRANSIT VEHICLES IN DYNAMICALLY RECONFIGURED TRAINS AND PLATOONS. VOLUME II, PART III, SYSTEMS OPERATIONS ANALYSIS**

This study shows that the passenger capacity of AGT systems may be significantly increased by operating vehicles in dynamically reconfigured trains or platoons. It is estimated that a minimum lane capacity of 5,000 to 10,000 passengers per hour is needed to make single-party AGT economically competitive with buses and that this capacity requires the use of trains. Trains also offer several non-capacity-related operational advantages. The longitudinal control systems needed to effect dynamic en/extrainment with platoon operations at spacings of 30-60 cm are developed with particular attention to stability, jerk limiting requirements, safety and passenger comfort. The capacity advantage of entraining is demonstrated for a single guideway link and for merge junctions, using Monte Carlo simulation. Variable-slot-length point-follower control is shown to reduce merge delays and maneuver ramp lengths compared with fixed-slot-length methods. The "zero gap" merge scheme developed here produces dramatic improvements compared with conventional merge strategies. The concepts of dynamic entrainment and platooning are shown to deserve more detailed study and testing because of the significant advantages they offer.

See also report dated Jul 79, PB80-142862.

Shladover, S

Massachusetts Institute of Technology, Urban Mass Transportation Administration, (UMTA-MA-06-0085) Final Rpt. UMTA-MA-06-0085-79-3, Oct. 1979, 236p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-198856

**11 318457****VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME I. PROJECT SUMMARY**

This report is one volume of a six-volume final report of the Vehicle Lateral Control and Switching (VLACS) Project sponsored by the Urban Mass Transportation Administration of the Department of Transportation. Volume I, this report, summarizes the results and significant findings of the project. The project objectives are to investigate and improve the steering and switching capabilities of automated transit vehicles through analysis, simulation, and test of lateral control of switching systems and to develop guidelines for the development of these systems. Three types of steering systems are investigated: (1) wire-follower power-assisted steering; (2) wall-follower power-assisted steering; and (3) passive wall-follower steering. The significant findings and major conclusions from each project task are included in this report. Also summarized and included in this report are the contents of the final project reports which describe the hardware studies, the design and simulation activities, the test program, and the data base report. Recommendations for future related studies are presented.

See also Volume 2, Part A, PB80-199730, and report dated Apr 78, PB-286 551. Also available in set of 7 reports PC E99, PB80-199714.

Haines, G Fry, M Mayer, F Peckham, G  
Otis Elevator Company, Urban Mass Transportation Administration,  
(UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-049, UMTA-IT-06-0156-79-1, Mar. 1980, 143p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-199722

**11 318458****VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME II. DESIGN AND ANALYSIS. PART A. VLACS MODELS**

This report contains design and analysis results from UMTA's Vehicle Lateral Control and Switching (VLACS) Project of the Automated Guideway Transit Technology (AGTT) Program. The objective of the VLACS project is to develop lateral control and switching systems which will reduce the cost and improve the performance of these systems on automated transit vehicles. The VLACS project tasks include a review of existing lateral control and switching technology, detailed mathematical modeling, analysis, simulation, detailed hardware studies, experimentation with alternative designs, and development of guideline specifications for VLACS systems. In this report, lateral control system models are developed for wire-follower, wall-follower active, and wall-follower passive lateral control systems, including the vehicle, lateral position sensors, and actuators. Vehicle dynamic models are developed for vehicles having Ackermann steering geometry and for vehicles with wagon-wheel steering. AGT vehicle models developed include ten-degree-of-freedom models used for ride quality analysis and simpler three-degree-of-freedom models used for lateral control system design and analysis. Part A of this report contains a description of VLACS model development.

See also Volume 1, PB80-199722, and Volume 2, Part B, PB80-199748. Also available in set of 7 reports PC E99, PB80-199714.

Fry, CM McHugh, T Greeson, J  
Otis Elevator Company, Urban Mass Transportation Administration,  
(UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-050A, UMTA-IT-06-0156-79-2, Mar. 1980, 470p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-199730

**11 318459****VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME II. DESIGN AND ANALYSIS. PART B. VLACS EVALUATIONS**

This report contains design and analysis results from UMTA's Vehicle Lateral Control and Switching (VLACS) Project of the Automated

Guideway Transit Technology (AGTT) Program. The objective of the VLACS project is to develop lateral control and switching systems which will reduce the cost and improve the performance of these systems on automated transit vehicles. The VLACS project tasks include a review of existing lateral control and switching technology, detailed mathematical modeling, analysis, simulation, detailed hardware studies, experimentation with alternative designs, and development of guideline specifications for VLACS systems. In this report, lateral control system models are developed for wire-follower, wall-follower active, and wall-follower passive lateral control systems, including the vehicle, lateral position sensors, and actuators. Vehicle dynamic models are developed for vehicles having Ackermann steering geometry and for vehicles with wagon-wheel steering. AGT vehicle models developed include ten-degree-of-freedom models used for ride quality analysis and simpler three-degree-of-freedom models used for lateral control system design and analysis. Part B of this report contains systems evaluations.

See also Volume 2, Part A, PB80-199730, and Volume 3, PB80-199755. Also available in set of 7 reports PC E99, PB80-199714.

Fry, CM McHugh, T Greeson, J  
Otis Elevator Company, Urban Mass Transportation Administration,  
(UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-050B, UMTA-IT-06-0156-79-3, Mar. 1980, 528p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
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PB80-199748

**11 318460****VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME III. DETAILED HARDWARE STUDIES**

Volume III, this report, contains a description of the hardware for the test vehicle and for nominal vehicle design for each of four vehicle classes (Shuttle Loop Transit, Group Rapid Transit Large, Group Rapid Transit Small, and Personal Rapid Transit) is described. The test vehicle which incorporates 2 or 4 wheel Ackerman steering and 2 or 4 wheel drive is configured to implement wire and wall-follower steering systems. Test data is used for mathematical model validation and for lateral control system evaluations. Nominal vehicle designs are described which are typical of lateral control system implementations used on AGT systems. Cost and weight estimates for the typical designs are presented.

See also Volume 2, Part B, PB80-199748, and Volume 4, PB80-199763. Also available in set of 7 reports PC E99, PB80-199714.

Evans, T Mayer, F Haines, G Oliver, W  
Otis Elevator Company, Urban Mass Transportation Administration,  
(UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-051, UMTA-IT-06-0156-79-4, Mar. 1980, 169p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-199755

**11 318461****VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME IV. TEST PROGRAM**

In this report, major emphasis is given to the results of three alternative steering techniques using the VLACS test vehicle and simulations. Use of test data for mathematical model validation is discussed. The three types of steering systems for rubber-tired transit vehicles which have been investigated are: (1) mechanical sensing without power steering (herding); (2) mechanical sensing with power steering; and (3) electromagnetic (wire-follower) sensing.

See also Volume 3, PB80-199755, and Volume 5, PB80-199771. Also available in set of 7 reports PC E99, PB80-199714.

Peckham, G Fry, M Mayer, F Haines, G  
Otis Elevator Company, Urban Mass Transportation Administration,  
(UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-052, UMTA-IT-06-0156-79-5, Mar. 1980, 139p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-199763



11 318462

**VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME V. DATA BASE**

Volume V, this report, provides a catalog of the data base material gathered and classified as part of the VLACS project. It contains (1) an annotated bibliography, which includes short summaries of the documents listed, a list of descriptors, and a series of user designators, and (2) a subject index, which includes numerous entries and subentries, and cross-references. The data base lists technical works dealing with vehicle lateral control, switching and steering systems, vehicle dynamics, ride quality, and other related topics. Its purpose is to help planners and designers find the material they need to evaluate and select automated guideway transit (AGT) systems.

See also Volume 4, PB80-199763, and Volume 6, PB80-199789. Also available in set of 7 reports PC E99, PB80-199714.

Gray, MJ

Otis Elevator Company, Urban Mass Transportation Administration, (UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-053, UMTA-IT-06-0156-79-6, Aug. 1979, 135p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS

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PB80-199771

11 318463

**VEHICLE LATERAL CONTROL AND SWITCHING. VOLUME VI. SOFTWARE MANUAL**

In this report, a description of the software developed for the VLACS project for study of AGT vehicle lateral control and switching systems is discussed. A simulation employing a ten-degree-of-freedom vehicle model for ride quality analysis and a simulation employing a three-degree-of-freedom vehicle model for lateral control studies are described. Also included is a description of the VLACS switching system analysis program.

See also Volume 5, PB80-199771. Also available in set of 7 reports PC E99, PB80-199714.

Fry, CM McHugh, T

Otis Elevator Company, Urban Mass Transportation Administration, (UMTA-IT-06-0156) Final Rpt. OTIS-TTD-VLACS-054, UMTA-IT-06-0156-79-7, Mar. 1980, 323p

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS

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PB80-199789

11 318512

**SUMMARY OF CAPITAL AND OPERATIONS AND MAINTENANCE COST EXPERIENCE OF AUTOMATED GUIDEWAY TRANSIT SYSTEMS. COSTS AND TRENDS FOR THE PERIOD 1976-1979. SUPPLEMENT II**

This report summarizes O&M cost experience and trends for the following AGT systems for the period 1976-1979: AIRTRANS, Sea-Tac, Tampa, Disneyworld (WEDway), and Morgantown (O&M data on the Morgantown system is reported through 1978). Capital cost data is reviewed on Morgantown Phase I, AIRTRANS, Tampa, Sea-Tac, Miami, Busch Gardens, Disneyworld, King's Dominion, and Fairlane. New capital cost data has been obtained from the Atlanta and Orlando Airports and the Minnesota Zoological Gardens. In addition to presenting capital and operating and maintenance costs and trends, this report includes analysis of the factors influencing these costs. A section on the differences between urban and non-urban settings of AGT systems has also been included and shows how the costs of existing non-urban systems might relate to a system in an urban deployment in terms of site conditions and site requirements.

See also Supplement 1, PB80-146483.

Comparato, TF von Rosenvinge, ME Kendall, DC

Transportation Systems Center, Urban Mass Transportation Administration Cost Rpt. DOT/TSC/UMTA-80-19, UMTA-MA-06-0069-80-1, Mar. 1980, 74p

ACKNOWLEDGMENT: NTIS

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PB80-204878

11 319641

**TRANSFERABILITY OF DEMAND ESTIMATION PROCEDURES**

Because of the transition of the public transportation system from that of operation by the city to one operated and supported by a newly created regionwide agency, the Downtown People Mover (DPM) program in Houston was deferred for approximately one year. Because of circumstances that had arisen during this hiatus, it was deemed appropriate to conduct a short-term, but intensive, reexamination of the DPM concept as originally developed in 1976. Because of the time constraints, it was decided to adapt modified demand forecasting procedures that had been applied in preliminary engineering activities for the downtown people mover system proposed for Los Angeles rather than develop original procedures with attendant (and significant) data assembly and calibration efforts. The activities undertaken to adapt, calibrate and verify these procedures to ensure their applicability for Houston DPM analysis are given here.

Hinkle, JJ (De Leuw, Cather and Company) *ASCE Journal of Transportation Engineering* Vol. 106 No. 4, July 1980, pp 369-380, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

11 319670

**LINEAR ELECTRIC MOTOR PROPULSION SYSTEMS FOR HIGH-SPEED GROUND TRANSPORT**

A 400 km/h linear induction motor system has been designed to propel a train on a London-Manchester route. The journey time would be one hour, and the equivalent fuel consumption would be somewhat better than that of a short-haul jet aircraft. If the BR magnetic suspension system were to be used, it would require only about 1 kW per tonne-of-lift and its maximum demand figure would be around 10 KVA per tonne.

IEE Conference Publication, International Conference on Electric Variable-Speed Drives, 2nd, London, England, September 25-27, 1979.

Peachey, CJ (GEC, England); Morgan, BE

Institution of Electrical Engineers Conf Paper No. 179, 1979, pp 122-125, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

DOTL JC

11 319698

**MAGNETICALLY SUSPENDED VEHICLES FOR TRACKED HIGH-SPEED TRAFFIC**

The author discusses the history of the development of magnetic levitation and the possible methods which could be used to power rapid transport systems. Development of a West German suspension system with permanent magnets was stopped due to the high cost of installing magnets on the guideway. The principles of the normal flux and zero flux procedures for electrodynamic magnetic suspensions are explained. Under the normal flux system, the vehicle has to start on wheels and does not levitate until a speed is reached where eddy-current braking forces are suitably reduced. The zero flux system has the advantage that brake losses were much less and it is more suited to positive guidance of the vehicle. Electrodynamic systems were considered to be uneconomical, and so electromagnetic systems using d.c. energized controlled electromagnets have been developed. The concept of the magnetic wheel, which improves the ride quality and reduces the dynamic requirements of the magnets is outlined.

Mayer, WT *Electric Vehicle Developments* No. 6, June 1980, pp 14-16, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 248461)

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

11 319700

**CABLE RAILWAYS. TECHNICAL SPECIFICATIONS [Telefericos. Pliego de condiciones tecnicas]**

This article presents Spanish legislation regarding the construction and operation of cable railways. These specifications apply to passenger cable railways (except teleskis and telesledges). Details are given of the installation, characteristics of cables, stations, cable bearing devices, vehicles, communication, safety devices, signalization and operation. [Spanish]

*Disposiciones Generales* Apr. 1979, p 1157, 4 Tab.



ACKNOWLEDGMENT: TRRL (IRRD 109393), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain  
 ORDER FROM: Disposiciones Generales, Boletín Oficial del Estado, Eloy Gonzalo, 19, Madrid 10, Spain

11 319954

#### A LINEAR SYNCHRONOUS MOTOR FOR HIGH SPEED SURFACE TRANSPORT [Linejnyj sinhronnyj dvigatel' dlja vysokoskorostnogo nazemnogo transporta]

The author proposes a calculation method for a synchronous linear motor, and determines the parameters and indices which should characterise it in the future. The auto-induction calculation is done by computer. In order to analyse the energy indices and motor weight indices, a variant was chosen on the basis of the following data: maximum speed, 400 km/h; number of cars, 10; length of train, 250 m. [Russian]

Sumejko, VV *Vestnik VNIIT* No. 2, 1980, pp 27-29, 5 Fig., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
 ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

11 319975

#### RIVAL MAG-LEV TRAINS WAIT FOR GREEN SIGNAL

A decision is expected this year on projects by Japan's railways, airline, and Transport Ministry.

Hartley, J *Engineer* Vol. 250 No. 6478, May 1980, pp 48-49, 5 Fig.

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

DOTL JC

11 319982

#### HIGH SPEED MAGNETICALLY LEVITATED TRANSPORT DEVELOPMENT IN CANADA

This paper outlines the concept development and experimental investigations constituting the Canadian MAGLEV development program to date, together with the planned and future activities. The motivation, overall objectives and short term goals of the program are defined. Organization and current status are presented. The technical characteristics of the proposed system are described, including guideway and vehicle configurations, vehicle levitation, propulsion and guidance, dynamics and ride quality, magnets and cryogenics, safety and environmental impact.

Atherton, DL *Journal of Advanced Transportation* Vol. 14 No. 1, 1980, pp 73-105

ACKNOWLEDGMENT: British Railways  
 ORDER FROM: Institute for Transportation, Incorporated, 1410 Duke University Road, Durham, North Carolina, 27705

11 322006

#### CLOSED-LOOP CONTROL OF LINEAR RELUCTANCE MOTORS FOR TRACTION APPLICATIONS

A description is provided of an experimental apparatus which has been used to confirm theoretical predictions of machine performance and demonstrates the successful application of load-angle control which enables the machine to run stably at any load-angle in the range plus or minus 90 deg. A smaller rig has been used to demonstrate airgap control at fixed load-angles.

International Conference on Electric Variable-Speed Drives, 2nd, London, September 25-27, 1979.

London, P (Sussex University, England); Williams, G Luke, PD El-Antaby, AM Edwards, JD *IEE Conference Publication* No. 179, 1979, pp 191-195, 5 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

11 322043

#### DEVELOPMENT OF THE MAGNETICALLY SUSPENDED TRANSPORTATION SYSTEM IN THE FEDERAL REPUBLIC OF GERMANY

The development of the magnetic suspension ground transport system began about 1970 and is proceeding in controlled project phases. The level of the development and selection of components and the functional tests reached by now form a sufficient basis for the next step, i.e., development and testing

of the system. Magnetic levitation vehicles are well adapted for automatic operation because they are tracked. The synchronous long-stator propulsion with active windings in the guideway and fixed frequency/speed ratio also meets all requirements for automatic operation. Modulation of speed and thrust is accomplished by stationary frequency changers. Close contacts are maintained with several states that are also working on the development of new long-distance transport systems. As a result of the development two applications appear to be possible: the magnetic suspension ground transport system as a superimposed long-distance transport system, and the magnetic suspension ground transport system as a solution to specific transport tasks in the medium-distance range.

Glatzel, KK Khurdok, G Rogg, D *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 3-17, 25 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

DOTL JC

11 322044

#### "MAGNETIC WHEEL" IN THE SUSPENSION OF HIGH-SPEED GROUND TRANSPORTATION VEHICLES

The electromagnetic support and guidance system for magnetic levitation railways consists of electromagnets on the vehicle and an armature rail on the track. Experience gained in the operation of experimental vehicles built so far lead to the development of a modular support and guidance system which uses the "magnetic wheel" as a self-contained functional unit. This concept, which is characterized by modular mechanical and electrical structures together with decentralized control systems, has made possible high reliability by functional redundancy and an improvement of the dynamic characteristics of the vehicle track systems. The results show that such a system is economically feasible within the constraints of existing technology.

Gottzein, E (Messerschmitt-Boelkow-Blohm GmbH); Meisinger, R Miller, L *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 17-23, 13 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

DOTL JC

11 322045

#### CONTROL SYSTEMS FOR OPERATING THE LONG STATOR MAGLEV VEHICLE TR 05

Operation of long stator Maglev transport systems requires instrumentation for remote control of the propulsion and for monitoring the actual operating conditions of the vehicle subsystems as well as of the propulsion itself. An additional control system is needed to provide data on instantaneous vehicle position and speed. To fulfill safety requirements, a self-contained unit has to monitor the limit values of vehicle velocity. A control system has been designed and manufactured for the TR 05 to perform these operations. It includes a slotted waveguide for wide-band transmission (0.8 GHz), a noncontact counting system which detects the teeth and slots of the stator, and inductive sensors working against trackside marks for the purpose of safe speed limit control. The system is described in detail.

Koerv, PAA (Messerschmitt-Boelkow-Blohm GmbH) *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 23-34

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

DOTL JC

11 322046

#### DETAIL AND EXPERIMENTAL RESULTS OF FERROMAGNETIC LEVITATION SYSTEM OF JAPAN AIR LINES HSST-01/-02 VEHICLES

Two high-speed surface transport vehicles employing linear induction motor propulsion and attractive electromagnet levitation have been designed, manufactured, and tested. The first test vehicle weighs one ton, is 4 m long, and incorporates eight electromagnets and a LIM with a maximum thrust of 300 kg. Levitating power is taken from batteries carried on board the vehicle, and three-phase power for the LIM propulsion is supplied from wayside power lines through the power collector. This vehicle achieved a maximum speed of 307.8 km/h on a 1300-m long test track in February, 1978. The second vehicle has a loaded weight of 2.3 tons and seats nine. It has carried about 1500 passengers since April 1978. Improvements include:



electromagnets fitted to the flexible chassis for better riding comfort by incorporating mechanical suspension between the chassis and the body; and with continuous levitation, the power for the LIM is rectified and supplied to the electromagnets jointly with the batteries carried on board.

Hikasa, Y (Japan Air Lines Company); Takeuchi, Y *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 35-41

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 322047

#### COMBINED MAGNETIC LEVITATION AND PROPULSION: THE MAG-TRANSIT CONCEPT

Mag-Transit is a combination of magnetic levitation and propulsion for people mover applications. Linear induction motors are used for levitation, propulsion, braking, and guidance. Since there are a minimum of moving parts there is a potential for a substantial increase in system reliability as compared to conventional systems. Solid-state technology provides the capability to condition sufficient quantities of electrical energy to control motor excitation, and thereby levitation, within a closed-loop servo system. Real time measurements of air gaps and vehicle accelerations are used to compute the desired levitation force. In addition, the solid-state electronics provides the ability to control independently the speed of the vehicle by a continuously variable excitation frequency to the motors. An overview is provided of the Mag-Transit concept from a control system standpoint. Results from a dynamic simulation of a test vehicle configuration are presented.

Rule, RG (Boeing Aerospace Company); Gilliland, RG *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 41-49, 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 322048

#### INTEGRATED MAGNETIC SUSPENSION AND PROPULSION OF GUIDED GROUND TRANSPORTATION VEHICLES WITH A SLIM

A summary of an experimental research project to evaluate a single-sided linear induction motor (SLIM) as an integrated suspension/propulsion system (ISPS) for guided ground transportation vehicles is presented. Experimental results for rotating wheel tests of a full size section of a SLIM are presented. Emphasis is given to an application in the speed range of 200 to 500 km/h, however an extension of the results to lower speeds can be realized with further study of the data. The results indicate that feasibility in such an application is limited to the extent that the adjudged benefits of ISPS outweigh the cost of the required onboard power conditioning unit (PCU). The size of the PCU increases with speed, nominal airgap, and the guidance/lift ratio desired. Results are presented to define the maximum practical speed for application as a function of the state of the art of PCU technology.

Katz, RM (Mitre Corporation); Eastham, AR Dawson, G *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 61-64

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 322049

#### POWER CONDITIONING SYSTEMS FOR A MAGNETICALLY LEVITATED TEST VEHICLE

The power conditioning for a magnetically levitated linear-motor propelled test vehicle is described. Control circuits have been developed to provide a constant air gap for levitation and improved damping of lateral motion due to force disturbances. Transistorized magnet drivers supply the required magnet current. A longitudinal control system with programmed limits on the second and third derivatives of the position command allows both precise position stopping and control of acceleration and jerk. A programmable controller is used for sequencing and monitoring the levitation and propulsion systems.

Fruechte, RD (General Motors Corporation); Nelson, RH Radomski, TA *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 50-60, 13 Ref.

ACKNOWLEDGMENT: EI  
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11 322050

#### COMPARISON OF THEORIES OF HIGH-SPEED LINEAR INDUCTION MOTORS

Four leading theories of linear induction motors (LIM's) are applied to the analysis of test data on the linear induction motor research vehicle (LIMRV). Computer models are exercised to demonstrate the operating regions over which the different finite size effects become significant. Each model is seen to yield a reasonable description of LIM performance within the limitations imposed by the model boundary assumptions. Variations in the predicted LIM normal force and input phase impedance are traced to different treatments of the finite size effects. Flux studies conducted on the LIMRV in the single-sided configuration demonstrate the presence of large phase belt modulation under static conditions.

Stickler, JJ (Department of Transportation) *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 65-71, 10 Ref.

ACKNOWLEDGMENT: EI  
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11 322051

#### COMPARISON OF COMBINED VERSUS SEPARATE LIFT/PROPULSION SYSTEMS

The notion of using the magnetic attractive force of a single-sided linear induction motor for suspension of a vehicle has recently received some attention. There is, therefore, some interest in determining how such a combined suspension/propulsion system would compare to separate lift and propulsion. Weight requirements of transverse flux dc lift magnets are calculated as a function of vehicle weight and magnet length. A three-phase longitudinal flux linear motor/suspension system is designed which has the same values of maximum flux and current density as the dc magnet. The effect of pole pitch on the weight of this motor is shown. Comparisons are made between this combined system and a system using the dc magnets plus a separate linear motor.

Barrows, TM (Department of Transportation) *IEEE Transactions on Vehicular Technology* Vol. VT-2 No. 1, Feb. 1980, pp 71-80

ACKNOWLEDGMENT: EI  
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11 322229

#### ANALYSIS OF DOWNTOWN PEOPLE MOVER SYSTEMS BY USING THE DPM SIMULATION MODEL

Downtown people movers (DPMs), a class of automated transit system that operates on exclusive guideways, are being considered by many cities as a possible solution to their circulation and distribution problems. This paper describes how a discrete event-simulation model developed by the Transportation Systems Center can be used in the planning and design of DPM systems. The paper identifies the variables that can be studied and that affect system ridership, cost, and performance by the model. The key inputs, the modeling functions, and outputs of the model are discussed in the context of an example, the 1990 Los Angeles DPM system. Use of the model to determine the feasible combinations of fleet size, vehicle capacity, and operating headway to meet the Los Angeles DPM system performance goals for the year 2000 is discussed. Finally, the use of the model to examine the effects of a vehicle failure on passenger service and system operation and to evaluate three algorithms for system recovery is illustrated. (Author)

This paper appeared in Transportation Research Record No. 751, Transportation System Analysis and Planning 1980.

Dooley, T *Transportation Research Record* No. 751, 1980, pp 9-17, 7 Fig., 2 Tab., 1 Ref.

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11 322517

#### ELECTROMAGNETIC SYSTEMS FOR HIGH-SPEED LINES (EMS) [Elektromagnetische Schnellbahnsysteme (EMS)]

The most promising levitation system, the electromagnetic system, has been tested at speeds of up to 400 km/h. In 1982, tests will begin on the



TRANSRAPID test loop at Elmsland. Between now and then, problems connected with choosing a route for the Frankfurt-Paris line will be investigated. Normal permissible tolerances. Line layout for 300 and 400 km/h speeds, sinusoidal transition curves, horizontal curve radii of 500 to 6,000 m, vertical curves of 3,600 to 50,000 m; Cant of up to 12. [German]

Moelzer, P. Zurek, R. *Allgemeine Vermessungs-Nachrichten* Vol. 87 No. 4, 1980, pp 154-165, 2 Tab., 11 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Herbert Wichmann Verlag, Rheinstrasse 122, Postfach 210729, 7500 Karlsruhe 21, West Germany

#### 11 322545

##### 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 ton 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 vehicleborne 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.

This report summarizes the results of Phase III of the Canadian Maglev program and details the design and operating characteristics of the proposed Maglev system.

Atherton, DL Belanger, PR Burke, PE Dawson, GE Eastham, AR Hayes, WF Ooi, BT Silvester, P Slemon, GR  
Canadian Institute of Guided Ground Transport, Transport Canada  
Research and Development Centre CIGGT 77-12, Sept. 1977, 67p, 36 Fig., 10 Tab., 33 Ref.

Contract OST5-0112

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#### 11 322550

##### LINEAR DRIVES: PRESENT DEVELOPMENT AND OUTLOOK

There are three basic types of electric machine: direct-current, synchronous and asynchronous. Of these, certain versions can be employed as linear motors. The article deals with the d.c. linear motor, the linear asynchronous and synchronous motor as short-stator drive. The aspect of cost for the substantial machine element on the track side is of importance in arriving at suitable linear motor variants. Another important consideration is the regulating unit owing to the substantial role of the power electronics in the drive concept. Also described and evaluated are the linear motor as

long-stator drive with integrated support function and the non-ferric synchronous long-stator drive. The exhibit featuring the long-stator drive with integrated support function at the IVA in 1979 showed the basic suitability of the technique although only limited train speeds were permitted there. The concept will be tested at speeds of up to 400 km/h in 1982 on an experimental track in Emsland in North Germany. [German]

Weh, H *Eisenbahntechnische Rundschau* Vol. 29 No. 6, June 1980, pp 401-406

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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#### 11 322551

##### THE TRANSRAPID TEST LAYOUT IN EMSLAND

In 1978 the "Magnetbahn Transrapid" consortium was established for the development, construction and operation of a magnetic levitation test track. It is led by Messerschmitt-Boelkow Blohm and includes firms who are prominent in the technologies involved, namely: AEG-Telefunken; Brown, Boveri; Dyckerhoff & Widmann; Krauss-Maffei; MBB; Siemens; Thyssen Industrie. The Transrapid experimental line is to be built in the Ems district of Ems district of North Germany for application testing and qualification of high-speed electromagnetic techniques. Development work started in mid-1978 and the building of the trackway is planned for 1980. The start of trial running with the TRANSRAPID 06 vehicle is scheduled for 1982. The article describes the aims, requirements and concept of the test layout. After adequate testing, the results will be applied in the mid-1980's to the construction of an urban or airport link route. By deciding on this large-scale scheme in Emsland, West Germany is maintaining its leading position in magnetic levitation. [German]

Eitlhuber, E *Eisenbahntechnische Rundschau* Vol. 29 No. 6, June 1980, pp 409-414

ACKNOWLEDGMENT: British Railways

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#### 11 322552

##### THE "H-BAHN": AN AUTOMATIC LOCAL TRANSPORT SYSTEM

In view of the worsening living conditions in towns and cities filled to overflowing with private cars, but also for economic reasons and to reduce great dependence on oil imports, there must be greater use of local public transport. But only a much improved service can bring this about. The automatic "H-Bahn" (or suspended rail system) developed by Siemens A.G. and DUWAG Waggon-fabrik Uerdingen A.G. offers such an opportunity at a cost which is comparable with conventional local transport. Its features are a frequent service with comfortable vehicles not only during the busy times of day, fast connections on a track unobstructed by other traffic, and the safety which is inherent in a tracked system. Trials have been carried out with the "H-Bahn" on a 1.4-km-long test track with six cars and three halts built at the Siemens research centre in Erlangen. It was shown that the short construction and assembly times causes only minimal hindrance to road traffic and also that the investment is profitable. During the trials, with so far 180,000 vehicle-kilometres and continuous running lasting several days, full success was achieved with the hierarchic automation structure, the computers and their programmes, the safety level and the vehicles with their D.C. or asynchronous linear motors. The trials suggested some improvements in detail and these are now being incorporated into the system. The "H-Bahn" is thus ready for public transport service. The first layout is to be built for Dortmund University and is scheduled to go into service at the end of 1982. [German]

Ziegler, W *Eisenbahntechnische Rundschau* Vol. 29 No. 6, June 1980, p 415

ACKNOWLEDGMENT: British Railways

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11 322554

#### THE ANALYSIS OF MEANS OF IMPROVING CHARACTERISTICS OF LINEAR INDUCTION TRACTION MOTORS FOR HIGH-SPEED GROUND TRANSPORT

The paper considers methods of improving the performance characteristics of high-speed linear induction traction motors (LITM). The theory of these machines is given based on the analysis of a three-dimensional magnetic field and it enables the characteristics of the motors having single-side or double-side inductors with any type of wind and different types of reactive buses (solid, laminar) to be calculated. A comparison of the calculated characteristics with the experimental data for the previously investigated model of LITM and of the high-speed LITM tested at Pueblo (USA), proves the accuracy of the calculations. Use has been made of the engineering method of calculation given in the previous article for making a general and effective analysis, and methods, have been determined for increasing tractive effort and improving other characteristics of the LITM. A more precise quantitative analysis and calculation of expected characteristics has been made based on the three-dimensional theory. It has been shown that the best effect may be obtained by reduction of the reactive bus conductivity to a rational value with a correct choice of the pole pitch of the inductor. The use of three-phase compensation windings is not effective. An analysis of the characteristics of motors with single-layer and double-layer windings for an odd and even number of poles is given.

Skobelev, VE *Rail International* Vol. 11 No. 6, June 1980, pp 369-380

ACKNOWLEDGMENT: British Railways  
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DOTL JC

11 322563

#### COMMUNITY ROUTES FOR AUTOMATIC CABIN-RAILWAYS USING THE H-BAHN (ELEVATED RAILWAY) AS AN EXAMPLE [Gemeinschaftsstrecken fuer Automatische Kabinenbahnen am Beispiel der H-Bahn]

The German federal minister for research and technology has been promoting the development of automatically driven cabin-railways. In recent years a series of towns have had feasibility studies for these systems carried out. The most comprehensive studies were produced in 1977 and 1978 for the towns and cities of Berlin, Erlangen, Hamburg and Marl. They give an insight into what costs and benefits automatic cabin-railways can give to single town areas or whole towns. For the results of the feasibility study for example it is important to know how much the special characteristics of automatic cabin-railways have been exploited insofar as benefits and costs are concerned. A lack of practical experience must be replaced by theoretical forward thinking, which requires a systematic procedure. The results which follow illustrate in particular the problems of "community routes" and are applicable to other track-systems. [German]

Ilgmann, G Noetzold, K *Internationales Verkehrswesen* Vol. 31 No. 3, May 1979, pp 168-171, 3 Fig., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 311463), 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

11 322571

#### DESIGN OF FEEDBACK CONTROL WITH LOW-SENSITIVITY FOR THE EXAMPLE OF MAGLEV VEHICLE [Entwurf eines Parameterunempfindlichen reglers am Beispiel der Magnetschwebbahn]

For the suspension magnet of a maglev vehicle with voltage control the state feedback controller is optimized with respect to a quadratic performance index. By including the sensitivity functions in the performance index, state variables as well as sensitivity functions are fed back. The original system and the sensitivity model are coupled are the sensitivity of the system can be reduced considerably. Transient time, however, increases, so that sensitivity reduction is limited. [German]

Breinl, W (Technical University of Munich, West Germany) *Regelungstechnik* Vol. 28 No. 3, Mar. 1980, pp 87-92

ACKNOWLEDGMENT: EI  
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11 322579

#### DESIGN STUDIES FOR SINGLE-SIDED LINEAR ELECTRIC MOTORS: HOMOPOLAR SYNCHRONOUS AND INDUCTION

Designs are made for longitudinal-flux, single-sided linear induction machines (SLIMs) and transverse-dc-flux homopolar linear synchronous machines (HLSMs). All machines have passive reaction rails. The machines are designed to provide tractive effort for conventional rail vehicles requiring output power from 200 to 3735 kW and top speeds ranging from 112 to 400 km/hr. Magnetic levitation is not a design consideration for these vehicles. All designs are optimized to achieve minimum track weight and are made according to specified magnetic and thermal criteria.

National Conference Publication of the Institution of Engineers, Australia, No. 79/12, Conference on Microprocessing Systems, Preprints of Papers, Melbourne, Australia, November 27-28, 1979.

Nondahl, TA (General Electric Company) *Electric Machines and Electromechanics* Vol. 5 No. 1, Jan. 1980, pp 1-14

ACKNOWLEDGMENT: EI  
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11 322805

#### WHY NEW TECHNOLOGIES CANNOT RADICALLY IMPROVE THE QUALITY OF URBAN TRANSPORTATION

In recent years a great deal of time and effort has been expended on the development of new modes of transport for cities. It is argued in this paper that this work is unlikely to be very productive because the major remaining flaw in the provision of transportation services-the inability of one mode to provide a good service to concentrated and dispersed trip ends-seems unavoidable. To make the required breakthrough a new mode must be frugal in its demands for space, flexible in its operation and fast. But an analysis of the performance of existing and prototype modes suggest that there is a fundamental technological barrier that precludes any one mode from performing well in more than two out of these three ways. This implies that any further improvements in travel for the urbanite must be made through existing modes and their derivatives and will be quite limited. It also suggests that the only possible way of substantially improving urban transportation is to build or rebuild towns so that one of the important mode attributes mentioned above is rendered superfluous.(a)

Poulton, MC *Transportation Planning and Technology* Vol. 6 No. 2, 1980, pp 75-80, 7 Tab., 9 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 248839)  
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DOTL JC

11 322816

#### PIPELINES CONSIDERED AS A MODE OF FREIGHT TRANSPORT: A REVIEW OF CURRENT AND POSSIBLE FUTURE USES

Pipelines are perhaps the least appreciated mode of freight transport. The unobtrusive distribution of many megatonnes of water, oil and gas in the UK annually is taken for granted and only the figures for oil appear in annual freight statistics. The transport of solids by hydraulic or pneumatic pipeline-either in free flow or packed into capsules-is technically more difficult and less common, but the practice is already well-established in certain specialised fields. After a brief introduction to the statistics for various freight transport modes, the author reviews the current usage of pipelines for water, sewage, gas and oil, before examining at length hydraulic "slurry" pipelines for a variety of minerals. The report concludes with a brief note on capsule pipelines which, apart from small-bore in-house delivery systems, are still in the prototype stage. A bibliography of over 100 references is given.(a)

James, JG,  
Transport and Road Research Laboratory, (0305-1315) Monograph  
TRRL SR592, 1980, 45p, 14 Fig., 6 Tab., 111 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249509)  
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11 322843

#### WESTINGHOUSE PEOPLE MOVER SYSTEM FOR GATWICK AIRPORT

The article describes the mass transit system to be built at London's Gatwick airport in the United Kingdom. The people mover track consists of twin concrete running surfaces for the rubber-tired load-bearing wheels with an

I-section guide beam between them. The Gatwick installation has twin tracks with a walkway between them. Rubber-tired guide wheels clamp on to each side of the guide beam, on top of which is mounted the current collection assembly.

Tucker, JR (Westinghouse Electric Corporation) *Railway Engineer International* Vol. 2 No. 2, Mar. 1980, pp 44-46

ACKNOWLEDGMENT: EI  
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**11 322961****ENERGY STUDY OF AUTOMATED GUIDEWAY TRANSIT (AGT) SYSTEMS**

Automated guideway transit systems provide passenger transportation on exclusive guideways in vehicles without operators. An energy study of 6 AGT systems was made for the Seattle-Tacoma International Airport; Tampa International Airport; Busch Gardens, Williamsburg, Virginia; Fairland Town Center, Dearborne, Michigan; Dallas-Fort Worth Regional Airport; and West Virginia University, Morgantown, West Virginia. Selected physical, operating, and economic characteristics of the systems; services rendered; direct, indirect, and capital energy demands; and energy intensities are described.

Henderson, C Cronin, RH Ellis, HT  
SRI International Aug. 1979, 99p

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**11 323190****TOLERANCE OF GUIDEWAY IRREGULARITY AND ITS CONTROL ON THE MIYAZAKI TEST TRACK**

The guideway for a magnetic levitation system must form a smooth running and guiding surface. For either tests or revenue service, the status of guideway irregularities is important. Guideway irregularities on the Miyazaki Test Track are discussed from the standpoint of superstructure design, and measurements developed with a guideway inspection vehicle are included.

Sato, Y Kishimoto, S Miura, S Takeshita, K *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 1-8, 13 Fig., 1 Tab.

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**11 323191****THEORETICAL PERFORMANCE OF SYNCHRONOUS MOTOR-GENERATOR INTERCONNECTED WITH POWER SYSTEM TO VARIABLE LOAD**

Power supply for linear motors of a magnetically levitated ground transportation system usually consists of a power source, transmission lines and substations with conversion equipment such as cycloconverters. If the converter is preceded by a synchronous motor-generator for frequency changing, the power supply is separated from any reactive power and harmonics due to power conversion. Motor generator transients, due to variable loads, are investigated and steady-state stability has been analyzed by an eigenvalue calculation with performance simulated by mathematical methods.

Mizuno, J *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 9-14, 7 Fig.

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**11 323192****POWER FEEDING CHARACTERISTICS OF GROUND-PRIMARY TYPE LINEAR MOTOR RAILWAYS**

Magnetic levitation with linear motor propulsion can involve power supplied either to a stator or to a moving element. The linear synchronous motor is generally of a ground-primary type with power supplied to the stator. Switching of the power feed is essential in this system and significantly

deteriorates linear motor characteristics, even though it depends also on related conditions. The phenomenon resembles the edge effect of the linear induction motor and can mean that the high efficiency and power factor of the linear synchronous motor is considerably reduced.

Saijo, T *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 15-21, 12 Fig., 3 Tab., 3 Ref.

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**11 323193****CONSTRUCTION AND CHARACTERISTICS OF DC LINEAR MOTOR**

A d-c linear motor consisting of vehicle-borne field magnets and wayside armature coils is characterized by simultaneous generation of lift and thrust. This paper reviews the systematic study of this propulsion system and the development of its components. Included in the investigation were high-speed performance, the control system, and upsizing the model experimental facility. Also studied were electromagnetic guidance, current-collection rollers, and electrodynamic levitation.

Umemori, T *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 22-28, 13 Fig., 3 Tab.

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**11 323194****APPLICATION OF TRAIN DETECTOR USING INDUCTIVE WIRES TO FEEDER SECTIONING CONTROL**

In an advanced transportation system using linear synchronous motors with the primary on the guideway, electric power must be supplied only to coils adjacent to the vehicles to maximize efficiency. A train location detector using inductive wires with transpositions is utilized. This detection system for feeder sectioning is seen as having other applications.

Sasaki, T *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 29-34, 9 Fig., 1 Tab.

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**11 323195****COOLING CHARACTERISTICS OF SUPER-CONDUCTING MAGNET COOLED WITH THE HELIUM REFRIGERATOR**

An on-board refrigeration unit in conjunction with a cryostat is essential in assuring ultra-low temperatures for a superconducting magnet. This paper reports the characteristics of such a cryostat cooled with liquid helium and compares experimental with calculated results.

Nakashima, H Herai, T *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 35-39, 9 Fig., 1 Tab., 6 Ref.

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**11 323196****A LINEAR SYNCHRONOUS MOTOR CONTROL METHOD AND ITS FEASIBILITY**

This paper proposes a method of controlling a linear synchronous motor to assure stability in all speed ranges and when there are a variety of transient conditions. It is concluded that further study is necessary to produce a practical control system.

Yasukawa, S Yuda, S *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 40-43, 8 Fig.

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**11 323197****A DYNAMIC RESPONSE OF MAGNETICALLY LEVITATED FLEXIBLE VEHICLE TO RANDOM TRACK IRREGULARITIES**

The body/truck configuration of a magnetically levitated flexible vehicle is modeled with the carbody as a uniform beam having free ends. It is

concluded that such a two-truck vehicle with secondary suspensions at two points on each side is most desirable when internal damping and bending stiffness of the carbody cannot be increased for other reasons.

Miyamoto, M *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 44-48, 8 Fig.

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11 323198

#### DAMPING CHARACTERISTICS OF THE REPULSIVE MAGNETIC LEVITATION VEHICLE

Fourier transform analyses of the passive damping force and of biased field damping have been performed for a maglev vehicle using a simple mathematical model. A rotary test rig produced experimental results for validation.

Fujiwara, S *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 49-52, 8 Fig., 1 Tab.

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11 323199

#### TEST RESULTS IN THE MIYAZAKI TEST TRACK FOR MAGNETIC LEVITATION VEHICLE

The test vehicle ML-500 made running tests on the Miyazaki Maglev Test Track in autumn 1977. From then until March 1978, various performance tests at up to 301 km/h were performed on the 3.1-km guideway. This paper describes the test facility and results from the initial tests concerned primarily with the characteristics of electromagnetic force for suspension, guidance and propulsion of the ML-500.

Kasai, K *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 1, Mar. 1980, pp 53-56, 7 Fig., 2 Tab., 2 Phot., 4 Ref.

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11 323369

#### CABIN SIZES AND PATTERN OF OPERATION OF A NEW PUBLIC TRANSPORT SYSTEM [Kabinengroesse und Betriebsablauf neuer Nahverkehrssysteme]

Firms developing new public transport systems tend to provide cabins with greatly varying carrying capacities for the same ranges of application. The cabin size has, however, a considerable influence on the important parameters of the operating process, such as for example, the waiting time and the travel speed of the passengers as well as the loading and operating capacity of the system. The influence of the cabin sizes on the operating pattern was studied by means of the simulation of a large cabin railway using two different networks. In addition to the cabin sizes other input data, such as the number of cabins, the type of station, the cabin speed, the method of operating and the loading were all varied. On the basis of data obtained from the simulation, a new method was developed by means of which it is possible to derive an optimum cabin size for particular cases of application. The journey speed and the vehicle-related operating costs were derived as optimization values. [German]

Bahm, G

Karlsruhe University, (0341-5503) Monograph No. 14, 1977, 103p

ACKNOWLEDGMENT: TRRL (IRRD 301569), Research Association for Road Communications, W Gr

ORDER FROM: Karlsruhe University, Instituts fuer Verkehrswesen, Kaiserstrasse 12, 7500 Karlsruhe, West Germany

11 324439

#### DRIVE CONCEPT OF H-BAHN VEHICLES

Selection and demands on drives for the track-bounded automatic rapid transit system (H-Bahn) are discussed. Advantages and disadvantages of the drive systems based on linear induction motors and on DC motors are described. Mechanical and electrical design of the drives and operating experience on test tracks are considered.

Brehm, W Buchberger, H *Siemens Power Engineering* Vol. 1 No. 2, Feb. 1979, pp 39-43, 5 Ref.

ACKNOWLEDGMENT: EI

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11 324497

#### TEST FACILITY FOR THE DETERMINATION OF LINEAR INDUCTION MOTOR PERFORMANCE

This report describes the experimental facilities and test equipment used to obtain the data for an assessment of the single-sided linear induction motor (SLIM) as an integrated suspension/propulsion system (ISPS), using either a squirrel-cage rail with laminated steel or a solid steel-only reaction rail. The performance of the SLIM over a wide range of operating conditions in the plugging, motoring and regenerative braking modes was determined at CIGGT. The assessment transportation was conducted by the MITRE Corporation. The tests were conducted by mounting the reaction rails on the rim of a 7.6 m diameter, 0-101 km/h wheel and by mounting the 6-pole SLIM primary in a stationary six-component force balance and adjustment system. Design details of the SLIM primary and reaction rail are given. The SLIM was excited by a 200 kVA VVVF PWM inverter. SLIM performance was determined by means of a 64-channel data acquisition system, allowing definition of the three-phase voltages, currents and powers, frequency, speed, gap, offset, forces and moments, and the flux distribution in the machine, for each condition.

Eastham, AR Atherton, DL Dawson, GE Schwalm, CL Canadian Institute of Guided Ground Transport, Mitre Corporation, (PRO-902) CIGGT 80-6, Aug. 1980, 46p, Figs., 10 Tab., Refs., 1 App.

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11 324882

#### THE PROMISE OF MAGLEV

Two versions of the linear motor for magnetic levitation vehicles are compared—the short stator and the long stator motors. General economic estimates for an electromagnetic levitation/propulsion railway link are presented along with the data on the most favorable energy consumption regimes.

Glatzel, K Schulz, H *IEEE Spectrum* Vol. 17 No. 3, Mar. 1980, pp 63-66

ACKNOWLEDGMENT: EI

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11 325720

#### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 1

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with laminated pole pieces over a wide range of frequency and excitation levels. The facility was instrumented to measure performance at the machine terminals, flux density in the air gap and machine, and forces in all six axes. The machine was tested under nominal conditions and with perturbations in five degrees of freedom: air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA

General Electric Company, Federal Railroad Administration Final Rpt. FRA/ORD-80/52-1, SRD-78-102, Sept. 1980, 115p, Figs., 5 Tab., 1 App.

Contract DOT-FR-64147

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11 325721

#### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 2

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with laminated pole pieces over a wide range of frequency and excitation levels. The



facility was instrumented to measure performance at the machine terminals, flux density in the air gap and machine, and forces in all six axes. The machine was tested under nominal conditions and with perturbations in five degrees of freedom: air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/52-2, SRD-78-102, Sept. 1980, 352p, 1 App.

Contract DOT-FR-64147

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#### 11 325722

##### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 3

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with laminated pole pieces over a wide range of frequency and excitation levels. The facility was instrumented to measure performance at the machine terminals, flux density in the air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/52-3, SRD-78-102, Sept. 1980, 324p, 1 App.

Contract DOT-FR-64147

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#### 11 325723

##### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 4

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with laminated pole pieces over a wide range of frequency and excitation levels. The facility was instrumented to measure performance at the machine terminals, flux density in the air gap and machine, and forces in all six axes. The machine was tested under nominal conditions and with perturbations in five degrees of freedom: air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/52-4, SRD-78-102, Sept. 1980, 242p, 1 App.

Contract DOT-FR-64147

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#### 11 325724

##### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 5

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with lami-

nated pole pieces over a wide range of frequency and excitation levels. The facility was instrumented to measure performance at the machine terminals, flux density in the air gap and machine, and forces in all six axes. The machine was tested under nominal conditions and with perturbations in five degrees of freedom: air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/52-5, SRD-78-102, Sept. 1980, 298p, 1 App.

Contract DOT-FR-64147

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#### 11 325725

##### PERFORMANCE OF A LINEAR SYNCHRONOUS MOTOR WITH LAMINATED TRACK POLES AND WITH VARIOUS MISALIGNMENTS. PHASE I-VOLUME 6

A test facility was designed and built to measure the performance of a single-sided high speed homopolar Linear Synchronous Motor with laminated pole pieces over a wide range of frequency and excitation levels. The facility was instrumented to measure performance at the machine terminals, flux density in the air gap and machine, and forces in all six axes. The machine was tested under nominal conditions and with perturbations in five degrees of freedom: air gap, lateral, pitch, roll, and yaw. Equivalent circuit parameters and flux form coefficients were measured and compared to design values. Poor correlation forced a revision of the design programs. The modeling of the finite interpolar gap and interpolar leakage flux led to good agreement between test and revised design values. The test data show a high power factor, the absence of end effects, and a strong tendency of the machine to remain properly aligned relative to the track, with the exception of a destabilizing pitch torque.

Mischler, WR Nondahl, TA  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/52-6, SRD-78-102, Sept. 1980, 236 p, 1 App.

Contract DOT-FR-64147

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#### 11 325726

##### PERFORMANCE OF A SINGLE-SIDED LINEAR INDUCTION MOTOR WITH SOLID BACK IRON AND WITH VARIOUS MISALIGNMENTS. PHASE II- VOLUME 1

A test facility was designed and built to measure all aspects of the performance of a single-sided high-speed linear induction motor with solid back iron over a wide range of frequency, speed, and excitation. The facility was equipped and instrumented to measure all the usual performance parameters plus all of the six-axis forces in normal operation and, when displaced, in the remaining five degrees of freedom (air gap, lateral, pitch, roll, and yaw). Performance in the normal position was compared to the mesh/matrix prediction. Generally good agreement was obtained between measured and predicted values of thrust and efficiency. Differences between predicted and measured thrust (especially at high slips) were related to the solid back iron and skin saturation. Agreement between predicted and measured normal forces was not satisfactory. The six-axis force measuring system was thoroughly analyzed to determine the range of validity of the measurements and the errors inherent in using a sector motor to simulate a flat linear motor.

Kliman, GB Mischler, WR Oney, WR  
General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/53-1, SRD-78-069, Sept. 1980, 103p, Figs., 8 Tab., 2 App.

Contract DOT-FR-64147

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11 325727

**PERFORMANCE OF A SINGLE-SIDED LINEAR INDUCTION MOTOR WITH SOLID BACK IRON AND WITH VARIOUS MISALIGNMENTS. VOLUME 2- APPENDIX B-PART 1**

A test facility was designed and built to measure all aspects of the performance of a single-sided high-speed linear induction motor with solid back iron over a wide range of frequency, speed, and excitation. The facility was equipped and instrumented to measure all the usual performance parameters plus all of the six-axis forces in normal operation and, when displaced, in the remaining five degrees of freedom (air gap, lateral, pitch, roll, and yaw). Performance in the normal position was compared to the mesh/matrix prediction. Generally good agreement was obtained between measured and predicted values of thrust and efficiency. Differences between predicted and measured thrust (especially at high slips) were related to the solid back iron and skin saturation. Agreement between predicted and measured normal forces was not satisfactory. The six-axis force measuring system was thoroughly analyzed to determine the range of validity of the measurements and the errors inherent in using a sector motor to simulate a flat linear motor.

Kliman, GB Mischler, WR Oney, WR

General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/53-2-1, SRD-78-069, Sept. 1980, 289p

Contract DOT-FR-64147

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11 325728

**PERFORMANCE OF A SINGLE-SIDED LINEAR INDUCTION MOTOR WITH SOLID BACK IRON AND WITH VARIOUS MISALIGNMENTS. VOLUME 2- APPENDIX B-PART 2**

A test facility was designed and built to measure all aspects of the performance of a single-sided high-speed linear induction motor with solid back iron over a wide range of frequency, speed, and excitation. The facility was equipped and instrumented to measure all the usual performance parameters plus all of the six-axis forces in normal operation and, when displaced, in the remaining five degrees of freedom (air gap, lateral, pitch, roll, and yaw). Performance in the normal position was compared to the mesh/matrix prediction. Generally good agreement was obtained between measured and predicted values of thrust and efficiency. Differences between predicted and measured thrust (especially at high slips) were related to the solid back iron and skin saturation. Agreement between predicted and measured normal forces was not satisfactory. The six-axis force measuring system was thoroughly analyzed to determine the range of validity of the measurements and the errors inherent in using a sector motor to simulate a flat linear motor.

Kliman, GB Mischler, WR Oney, WR

General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/53-2-2, SRD-78-069, Sept. 1980, 272p

Contract DOT-FR-64147

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11 325729

**COMPARISONS BETWEEN DESIGNS FOR SINGLE-SIDED LINEAR ELECTRIC MOTORS: HOMOPOLAR SYNCHRONOUS AND INDUCTION. PHASE III**

A design study of two types of single-sided (with a passive rail) linear electric machine designs, namely homopolar linear synchronous machines (LSM's) and linear induction machines (LIM's), is described. It is assumed the machines provide tractive effort for several types of light rail vehicles and locomotives. These vehicles are wheel supported and require tractive powers ranging from 200 kW to 3735 kW and top speeds ranging from 112 km/hr to 400 km/hr. All designs are made according to specified magnetic and thermal criteria. The LSM advantages are a higher power factor, much greater restoring forces for track misalignments, and less track heating. The LIM advantages are no need to synchronize the excitation frequency precisely to vehicle speed, simpler machine construction, and a more easily anchored track structure. The relative weights of the two machine types vary with excitation frequency and speed; low frequencies and low speeds favor the LSM. The effect of variations in several LSM design parameters are shown to illustrate trends in machine dimensions, track weight, and commutating reactance. The details of the LSM design programs are described and a Fortran IV listing of the programs is provided.

Nondahl, TA Richter, E

General Electric Company, Federal Railroad Administration Final Rpt.  
FRA/ORD-80/54, Sept. 1980, 121p, Figs., Tabs., 10 App.

Contract DOT-FR-64147

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PB81-116188, DOTL NTIS, DOTL RP

11 325882

**EFFECT OF TIME HARMONICS ON THE THRUST OF A LINEAR INDUCTION MOTOR WITH DISCRETE WINDINGS**

A study is presented of a linear induction motor fed from a nonsinusoidal constant current supply. It is shown that time harmonics reduce the thrust developed by the motor, particularly at low slips. Discreteness of the winding influences the performance of the motor as slot edges introduce another type of end effects. The measured results demonstrate that slot harmonics cause significant dips in the thrust-slip characteristics. The study may be useful in the cases of linear induction motors used in high speed ground transportation where the utilization of inverters for speed control is inevitable.

Proceedings-International Conference on Electric Machines, v1, Brussels, Belgium, September 11-13, 1978.

Saleh, MA Makky, AR El-Gendi, MS

Catholic University, Louvain 1978, p L2.4.1, 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Catholic University, Louvain, Laboratory for Electric Machines, Louvain, Belgium

11 325891

**COMPARISON OF SINGLE SIDED AND DOUBLE SIDED LINEAR MOTORS**

To compare performance characteristics of single-and double- sided linear induction motors used in vehicles for high speed ground transportation, theoretical calculations were made and tests were carried out which determined thrust power factor, efficiency, weight, vertical force, etc., of these motors. It was found that the thrust of single-sided motors. It was found that the thrust of single-sided motors is about 80% higher than with double-sided motors. Power factor and efficiency are almost equal. The normal force of the single-sided motor with same length is higher by a factor of 2.7 and can therefore contribute to the total lift force of the suspension system.

Proceedings-International Conference on Electric Machines, v1, Brussels, Belgium, September 11-13, 1978.

Oberretl, K (Dortmund University, West Germany)

Catholic University, Louvain 1978, p L1.4.1, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Catholic University, Louvain, Laboratory for Electric Machines, Louvain, Belgium

11 325892

**PROPULSION SYSTEMS FOR MAGNETICALLY SUSPENDED VEHICLES**

The short-and the long-stator propulsion systems for magnetically suspended vehicles are described. Qualified configurations, motor performance characteristics, power conditioning and control, motor design among other aspects are described and compared.

Proceedings-International Conference on Electric Machines, v1, Brussels, Belgium, September 11-13, 1978.

Lang, A

Catholic University, Louvain 1978, p L3.3.1, 6 Refs.

ACKNOWLEDGMENT: EI

ORDER FROM: Catholic University, Louvain, Laboratory for Electric Machines, Louvain, Belgium

11 325893

**CHARACTERISTICS OF THE FORCE COMPONENTS OF AN AIR-CORED LINEAR SYNCHRONOUS MOTOR WITH SUPERCONDUCTING EXCITATION MAGNETS**

A method of calculation is presented to analyze the various characteristics of an air-cored linear synchronous motor, which has been proposed as the propulsion system for high-speed magnetically levitated vehicles. The method uses firstly Biot-Savart's Law to determine the magnetic flux density

vector and then Ampere's Law to calculate the forces and moments acting on the individual conductors of the stator winding as well as on the superconducting excitation magnets. Both the effects of stator winding geometry and for current harmonics in the power supply are investigated.

Proceedings--International Conference on Electric Machines, v1, Brussels, Belgium, September 11-13, 1978.

Lingaya, S Persch, CP  
Catholic University, Louvain 1978, p L4.2.1., 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Catholic University, Louvain, Laboratory for Electric Machines, Louvain, Belgium

11 325933

#### COMPARISON BETWEEN TYPES OF TRACTION ON METRO SYSTEMS IN RELATION TO ENERGY CONSUMPTION

[Confronto fra sistemi di trazione per ferrovie metropolitane nei riguardi del consumo di energia]

One of the main causes of electrical energy loss in railway traction is transformation into heat during braking. Because of this, the author compares two conventional braking systems, dynamic and regenerative, with a new type of traction and braking involving the use of kinetic energy and gravitation. He sets out arguments to support the latter notion and expresses the hope that more studies will be conducted on this subject. [Italian]

Accattatis, F *Ingegneria Ferroviaria* Vol. 35 No. 6, June 1980, pp 521-532, 8 Phot., 8 Ref.

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

DOTL JC

11 326270

#### SYSTEMS OPERATION STUDIES FOR AUTOMATED GUIDEWAY TRANSIT SYSTEMS: CLASSIFICATION AND DEFINITION OF AGT (AUTOMATED GUIDEWAY TRANSIT) SYSTEMS

The report describes the development of an AGT classification structure. Five classes are defined based on three system characteristics: service type, minimum travelling unit capacity, and maximum operating velocity. The five classes defined are: Personal Rapid Transit (PRT); Small Vehicle Group Rapid Transit (SGRT); Intermediate Vehicle GRT (IGRT); Large Vehicle GRT (LGRT); and Automated Rail Transit (ART). All classes except LGRT and ART are further stratified on the basis of speed, resulting in a total of eight subclasses. Forty-four existing and proposed AGT systems are summarized and used to define ten representative systems in terms of nominal values and ranges of selected characteristics. A summary of the system information compiled and used to complete this task is presented in Appendix A of this report. This report also provides a bibliography, list of text references, and a glossary of terms.

See also report dated Apr 80, PB80-193386.

Lee, RA Alberts, FSA  
General Motors Technical Center, Transportation Systems Center,  
Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. DOT-TSC-UMTA-79-50, Feb. 1980, 165p

Contract DOT-TSC-1220

ACKNOWLEDGMENT: NTIS  
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PB80-226509

11 326294

#### SYSTEMS OPERATION STUDIES FOR AUTOMATED GUIDEWAY TRANSIT SYSTEMS. SUMMARY REPORT

In order to examine specific Automated Guideway Transit (AGT) developments and concepts and to build a better knowledge base for future decision-making, UMTA has undertaken a new program of studies and technology investigations called the Urban Mass Transportation Administration (UMTA) Automated Guideway Transit Technology (AGTT) Program. The objectives of one segment of the AGTT program, the Systems Operation Studies (SOS), are: (1) to develop models for the analysis of system operations; (2) to evaluate AGT system performance and cost; and (3) to establish guidelines for the design and operation of AGT systems. The results of the SOS project are summarized in this final report. The

characteristics of 43 existing or proposed AGT systems were inventoried, and the information was used to develop a system classification structure. Classes of metropolitan and activity center demand applications were defined and demand matrices based on survey data from representative locales were generated. A restricted number of combinations of system classes, demand types, and network types were developed as representative deployment scenarios for analysts. An extensive list of possible performance measures was developed and then condensed to an initial set of 14 system level measures. A comprehensive set of computer software has been developed and tested. The various computer programs permit the simulation of entire AGT systems as well as major subsystems, including stations, links, merges, and intersections.

Lee, RA Thompson, JF Oglesby, RN Bonderson, LS  
General Motors Technical Center, Transportation Systems Center,  
Urban Mass Transportation Administration, (UMTA-MA-06-0048) Final Rpt. UMTA-MA-06-0048-8012, Feb. 1980, 132p

Contract DOT-TSC-1220

ACKNOWLEDGMENT: NTIS  
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11 329521

#### MODELS OF TECHNOLOGICAL DEVELOPMENT AND THEIR RELEVANCE TO ADVANCES IN TRANSPORTATION

The study described presents a general theory of technological development. The theory is applied to a variety of cases of innovation in the locomotive, tank ship, and aircraft technology over the course of time. The author shows that the theory of functional aspects of technological change has further important implications for studies of diffusion of innovations.

Sahal, D *Technological Forecasting and Social Change* Vol. 16 No. 3, Mar. 1980, pp 209-227, 41 Ref.

ACKNOWLEDGMENT: EI  
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11 329529

#### GAMBLING WITH A LOSER. A HISTORY OF THE LAS VEGAS PRT PROJECT

This paper compiles a history of the project derived from more than 90 newspaper articles and planning documents, supplemented by conversations with individuals close to the project. It is shown that problems in planning, coordination and demand estimation were the primary causes for the defeat of the system.

Lutin, JM (Princeton University); Falls, MD *Transportation Research: Part A: General* Vol. 14A No. 3, June 1980, pp 185-196, 59 Ref.

ACKNOWLEDGMENT: EI  
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12 312187

**COLLISION OF M/V STUD WITH THE SOUTHERN PACIFIC RAILROAD BRIDGE OVER THE ATCHAFALAYA RIVER BERWICK BAY, LOUISIANA APRIL 1, 1978. MARINE ACCIDENT REPORT**

At 1756 c.s.t., on April 1, 1978 the four-barge tow of the Motor Vessel STUD collided with the eastern fixed span of the Southern Pacific Railroad bridge over the Atchafalaya River near Berwick Bay, Louisiana. The collision knocked the span from its supporting piers into the river but did not damage the barges. Damage to the STUD was estimated to be \$4,000. Property damage was estimated to be \$1,400,000, including the cost of replacing the bridge span and rerouting rail traffic for 8 days. There were no deaths or injuries. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the master to properly align the underpowered tow on the approach north of the Berwick Bay bridges. Contributing to the cause were the inadequate criteria for commencing high water limitations in the Berwick Bay Vessel Traffic Service area, the inadequate horsepower of the STUD in relation to the towlength for maneuvering in the existing river conditions, and the fact that the master of the STUD did not have up-to-date information concerning the river stage and current velocity.

National Transportation Safety Board, (2886) NTSB-MAR-80-5, Mar. 1980, 34 p.

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PB80-182710, DOTL NTIS

12 314185

**TRANSPORTATION OF LOW-LEVEL RADIOACTIVE WASTE INTO SOUTH CAROLINA**

Shipments of low-level radioactive waste into the Chem-Nuclear Systems, Inc. site near Barnwell, S.C., were surveyed to determine the origin of such wastes, types and condition of packages or containers, and compliance with existing regulations. Type A shipping casks were given special attention during the survey. Area monitors (TLD) were used around transportation terminals.

Sponsored in part by Department of Transportation, Washington, DC.

South Carolina State Dept of Health & Env Control, Nuclear Regulatory Commission, Department of Transportation Apr. 1980, 45p

Contract NRC-06-78-357

ACKNOWLEDGMENT: NTIS

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NUREG/CR-1434

12 314289

**RAILROAD ACCIDENT REPORT-HEAD-END COLLISION OF AMTRAK TRAIN NO. 392 AND ICG TRAIN NO. 51, HARVEY, ILLINOIS, OCTOBER 12, 1979**

At 9:05 p.m., c.s.t., on October 12, 1979, northbound Amtrak passenger train No. 392 was traveling at 58.5 mph on track No. 4, at Harvey, Illinois. Illinois Central Gulf Freight Train No. 51 was waiting on track No. 3 to crossover to track No. 4 after train No. 392 went north. The switchtender on duty at Harvey aligned the crossover switch on track No. 4 seconds before train No. 392 arrived. Train No. 392 entered the crossover and struck train No. 51. The engineer and head brakeman on board train No. 51 were killed, and all 6 crewmembers and 38 passengers on board train No. 392 were injured. The National Transportation Safety Board determines that the probable cause of the accident was the switchtender's manual misalignment of a switch, immediately in advance of a train, which caused train No. 392 to be directed into a crossover and collide with a standing freight train on the adjacent track. The misalignment was made possible by the lack of an interlock or other positive means to prevent its movement. Contributing to the accident was the lack of training and limiting experience of the employee assigned as switchtender.

National Transportation Safety Board NTSB-RAR-80-3, Apr. 1980, 35p

ACKNOWLEDGMENT: NTIS

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12 318247

**TRANSPORTATION OF NUCLEAR FUEL**

Shipment of used fuel from nuclear reactors to a central fuel management facility is discussed with particular emphasis on the assessment of the risk

to the public due to these shipments. The methods of transporting used fuel in large shipping containers is reviewed. In terms of an accident scenario, it is demonstrated that the primary risk of transport of used fuel is due to injury and death in common road accidents. The radiological nature of the used fuel cargo is, for all practical purposes, an insignificant factor in the total risk to the public.

U.S. Sales Only.

Prowse, DR

Atomic Energy of Canada Limited Jan. 1979, 10p

ACKNOWLEDGMENT: NTIS

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AECL-6331

12 318336

**RAILROAD ACCIDENT REPORT-REAR-END COLLISION ON-CONRAIL COMMUTER TRAINS, PHILADELPHIA, PENNSYLVANIA, OCTOBER 16, 1979**

On October 16, 1979, about 8:19 a.m., northbound Consolidated Rail Corporation (Conrail) train No. 1718 collided with the rear end of standing Conrail train No. 0714 and caused it to move forward and collide with standing Conrail train No. 716 on track No. 1 of Conrail's West Chester Branch, just north of the Angora station at Philadelphia, Pennsylvania. Of the 525 persons who were injured, one crewmember of train No. 0714 died 6 days after the accident. Equipment damage was estimated at \$1,940,312. The National Transportation Safety Board determines that the probable cause of this accident was the engineer of train No. 1718 operating at a speed above that authorized by the block signal indication which did not allow for his stopping the train before it collided with a standing train. Contributing to the accident was the engineer's improper operation of the train brakes and the failure of a supervisor and traincrew personnel in the operating compartment of the locomotive to monitor the train's operation adequately and to take action to insure that the train's speed was reduced or that it was stopped when its speed exceeded that authorized for the signal block.

National Transportation Safety Board NTSB-RAR-80-5, May 1980, 39p

ACKNOWLEDGMENT: NTIS

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PB80-191182, DOTL NTIS

12 318337

**RAILROAD ACCIDENT REPORT-DERAILMENT OF AMTRAK TRAIN NO. 4, THE SOUTHWEST LIMITED, ON THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY, LAWRENCE, KANSAS, OCTOBER 2, 1979**

About 6:10 a.m., on October 2, 1979, Amtrak passenger train No. 4, the Southwest Limited, derailed 3 locomotive units and 17 cars while moving through a 7 degree curve on the Atchison, Topeka and Santa Fe Railway Company's tracks at Lawrence, Kansas. The speed of the train was 78 mph. Of the 147 passengers and 30 crewmembers, 2 persons were killed and 69 persons were injured. Property damage was estimated at \$4,634,330. The National Transportation Safety Board determines that the probable cause of this accident was the operation of the train at an excessive rate of speed into a 7 degree curve. The engineer failed to reduce the speed of the train because of a missing speed-restriction sign, inoperative automatic train stop equipment, and his unfamiliarity with the route. Contributing to the accident were the assignment of an engineer who did not meet the Atchison, Topeka and Santa Fe Railway Company's operating familiarization qualifications for the route, and a resume-speed sign placed within 1,100 feet of the missing speed-restriction sign.

National Transportation Safety Board NTSB-RAR-80-4, Apr. 1980, 61p

ACKNOWLEDGMENT: NTIS

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PB80-191190, DOTL NTIS

12 318934

**ASSESSMENT OF THE RISKS ASSOCIATED WITH THE USE OF CARBON FIBERS IN SURFACE TRANSPORTATION**

This report presents the results of an assessment of the potential risks associated with the use of carbon-fiber composites in the surface transportation system and the development of a data base on the vulnerability of the surface transportation system to airborne carbon fibers. In conducting the risk assessment, TSC estimated the potential usage rate of carbon-fiber composites in surface transportation, the frequency and severity of vehicle

fires and the expected carbon-fiber release from the composite in a fire. In developing the data base on the vulnerability, TSC reviewed and analyzed the electrical and electronic systems present in the various surface-transportation modes.

Hathaway, WT Hergenrother, KM Bogner, CE  
Transportation Systems Center Final Rpt. DOT-TSC-RSPA-80-10,  
June 1980, 108p

ACKNOWLEDGMENT: NTIS  
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PB80-208309

#### 12 319683

##### THE IMPACT OF FEDERAL SAFETY APPLIANCE LEGISLATION UPON RAILROAD ACCIDENTS

This study sought to ascertain the implications of federal legislation mandating adoption of technological change by the railroad industry. Its primary aim was to determine whether the Safety Appliances Act of 1893, which required railroads to outfit rolling stock with air brakes and automatic couplers, led to improved safety for employees and if any resultant gain was offset by unforeseen consequences. It sought to learn whether the devices had greater consequences for safety or productivity. A mathematical model examines both direct and indirect implications of introducing the brake and coupler on railroad accidents and operations, analyzing accidents involving operating employees in Illinois between 1891 and 1913 and endeavoring to explain why the number of accidents failed to decline over the period. It was concluded that technical innovation actually contributed to improved productivity and that the longer and faster trains that were possible then caused accidents to increase.

Wetzel, KW  
Illinois University, Urbana Phd Thesis 1978, 239p

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Ann Arbor, Michigan, 48106

DOTL HE1780.W48

#### 12 319692

##### TRANSCHEME 79. SIXTH SYMPOSIUM ON THE SAFE TRANSPORTATION OF HAZARDOUS SUBSTANCES, HELD AT TEESSIDE POLYTECHNIC, MIDDLESBROUGH, 9-10 APRIL, 1979

The following papers were presented at the symposium: Decisions preceding the movement of hazardous substances by road, rail and pipeline (Halfpenny, AJ); Compatibility and segregation of hazardous substances in transit (Anderson, PN); Constraints on the movement of certain substances (Cumberland, RF); Constraints on the movement of hazardous substances (Ashton, WG); Experience in Holland (Druiff, HJ); After the tanker marking scheme (Jeacocke, GJ); Movement of hazardous substances through port areas (Lewis, PJ); Safety in the transportation of LPG (Barber, D); The Spanish camp fire disaster (Stinton, HG); The effects of the impending legislation on the conveyance of hazardous goods by road-the manufacturer's view; Load recovery resource organization (Stapleton, W); First aid and medical aspects (Wright, AP); Safe recovery of damaged chemical tankers (Clayton, WE); The role of the highway authority (Hilton, MR); Experience in dealing with incidents in Humberside (Brady, D). (TRRL)

Teesside Polytechnic Monograph No Date, n.p., Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 248126)

ORDER FROM: Teesside Polytechnic, Borough Road, Teesside, Middlesbrough, England

#### 12 319706

##### THE TEN MOST CRITICAL ISSUES IN HAZARDOUS MATERIALS TRANSPORTATION

This paper addresses issues under the headings of: Regulations; A Coordinated Systems Approach; Data and Data Applications; Legal Responsibilities; and Public Awareness. The issues in the first category are: harmonious international, federal, state and local hazardous materials regulatory controls; and the complexity of D.O.T.'s Hazardous Materials Regulations and the need to convert some of them from detailed specifications to performance base criteria. In terms of a coordinated systems approach, four issues are addressed—a national strategy for control of hazardous material risks; training for all persons involved in the transportation of hazardous materials, including shippers carriers, and emergency response personnel; a single national response system for incidents and

accidents involving the transportation of hazardous materials; and an integrated hazardous materials transportation administrative communication system among Federal and State governments. Two issues are discussed under the heading of data and data applications—a comprehensive data system for the flow of hazardous materials by quantity, general hazard class, route and mode; and the state-of-the-art for hazardous materials transportation cost-benefit-risk analysis methodology. Clarification of the legal responsibilities of governmental and private agencies involved in hazardous materials transportation is discussed under the heading of legal responsibilities. The final issue is the understanding of the public about the relative safety of hazardous materials transportation.

Transportation Research Circular No. 219, July 1980, 11p, 11 Ref., 1 App.

ORDER FROM: TRB Publications Off

#### 12 319937

##### A REVIEW OF THE DEPARTMENT OF TRANSPORTATION RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION'S HAZARDOUS MATERIALS RESEARCH AND DEVELOPMENT PROGRAM

In response to a DOT request to review its Research and Special Programs Administration's R&D for hazardous materials, NRC's Committee on Transportation made a series of observations and recommendations. It calls for an improved data base, a clarification of conflicts between DOT and other federal agencies, a more positive means of identifying and describing hazardous materials, improved methods of risk analysis, a renewed effort to develop cooperation with state and local agencies, a new emphasis on prevention of events rather than improved response, encouragement of innovative approaches to hazmat transport, better understanding of the transportation problems, and increased R&D funding.

National Academy of Sciences-Natl Research Council 1980, 47p, 1 Fig.,  
6 Tab., 14 Ref., 5 App.

Contract DOT-RC-92002

ORDER FROM: National Academy of Sciences-Natl Research Council,  
Committee on Transportation, Washington, D.C., 20418

#### 12 319958

##### WORKING ON TRACK WITH OVERHEAD CONTACT LINES [Oberbauarbeiten unter der Fahrleitung]

On the basis of practical experience attention is drawn to dangers which prevail when track work is being carried out on electrically operated lines. The article deals with the measures required to ensure protection and safety during maintenance work and when breakdown or accidents occur. [German]

Sauer, K *Eisenbahn Technische Praxis* Vol. 32 No. 1, 1980, pp 14-17, 16  
Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Gewerkschaft der Eisenbahner Deutschlands, Beethoven-  
strasse 16-18, 6000 Frankfurt, West Germany

#### 12 320311

##### ACCIDENT DATA

These tapes include the following information: Train code, district, road number, class of accident, damages to equipment and track, train speed, number of train cars, method of operation, kind of defect, explosives, cause of accident, day of week, hour, weather, part of train struck, crossing and operation protection, visibility, illumination, auto speed, stalled or stopped, motor carrier act, defect or negligence, trespassers killed or hurt, trainmen killed or hurt, other employees on duty killed or hurt, passengers killed or hurt. Summary report is published annually.

Available on 4 tapes, 9-track, 800 BPI and also paper copy.

Federal Railroad Administration Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (311)  
ORDER FROM: FRA

#### 12 320312

##### RAILROAD ACCIDENT/INCIDENT REPORTING SYSTEM (RAIRS)

The principal data are railroad codes, casualty information, damage costs, location of accident, train speed, weather, and grade crossing information.

1) Accident bulletin: A single bulletin number assigned to each year since 1922, gives brief tables on casualties to persons of all classes of passengers,

to employee, to trespassers; Highway grade-crossing accidents, & train accidents. Also further breakdown of accidents by individual railway. 2) Preliminary report of railroad accident/incidents and resulting casualties--published 2 months after cover date. 3) Summary of accidents/incidents reported by all line-haul switching and terminal railroad companies--same data, published 6 months after cover date. (Formerly summary of accidents reported by steam railways, 1924-1966, published by ICC) 4) Rail-Highway grade-crossing accidents/incidents--since 1935, gives time of accidents, type, kind of crossing protection, types, and speeds of vehicle and trains involved, weather conditions, etc.

Published reports: Accident Bulletin (Annual); Rail-Highway Grade-Crossing Accidents (Annual); Preliminary Report of Railroad Accident/Incidents and Resulting Casualties (Monthly); & Summary of Accident/Incidents Reported by All Line Haul & Switching & Terminal Railroad Companies (Monthly). Data are received from railroads on the standard FRA Accident Reporting form monthly, with a summary report at the end of the year.

Federal Railroad Administration Monthly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (312)  
ORDER FROM: DOT

#### 12 320313

##### SUMMARY OF ACCIDENTS INVESTIGATED BY THE FEDERAL RAILROAD ADMINISTRATION (1968-PRESENT)

Presents summary data on causes and circumstances of railroad accidents investigated by the Federal Railroad Administration. Contains synopsis and extended table, showing for each accident: A. Railroad involved. B. Time, location, and type (derailment, collision, other). C. Fatalities and injuries. D. Estimated cost of damage to railroad equipment. E. Method of operation, movement involved, equipment derailed, and cause.

Paper.

Federal Railroad Administration Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (313)  
ORDER FROM: FRA

#### 12 320316

##### RAILROAD ACCIDENT DATA

The yearly data is separated into three files: Train accidents, Non-train accidents and Train service accidents. From these files, several statistical tables were produced. Examples are 1. Train accident severity ratings for important track cause codes, 2. Train accidents by railroad company, 3. Absolute yearly and normalized yearly rail-caused train accidents by state. Data covers period 1967-1974.

9 Tapes, 9-track, 800 BPI, ASCII.

Transportation Systems Center No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (316)  
ORDER FROM: TSC

#### 12 320634

##### HAZARDOUS MATERIALS INCIDENT REPORTING SYSTEM

The system is used to process information on the unintentional release of hazardous materials during the course of transportation. This information is compiled in accordance with the requirement levied in the Transportation Safety Act of 1974, Public Law 93-633. Areas, pinpoint need for corrective action, and provide a statistical compilation of all accidents and incidents involving hazardous materials. The system contains information on each reported incident and consists of data elements such as the date of the incident, location, shipper, carrier, commodity involved, and other detailed information concerning the packaging and nature of the incident. Monthly and yearly reports are generated and include: carriers by mode, incidents involving exemptions, incidents involving reconditions, shippers monthly report, commodity/container summary report, container and cause summary report, shippers by location, and incidents by location.

For internal use only; however requests for info are filled by the Office. Carriers are required to submit a detailed Hazardous Materials Incident Report (DOT form 5800.1) to the Office of Hazardous Materials Operations upon any occurrence of an unintentional release of a hazardous material in transportation.

Materials Transportation Bureau Monthly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (634)  
ORDER FROM: Materials Transportation Bureau, 400 7th Street, SW, MTB-1, Washington, D.C., 20590

#### 12 320854

##### NET 3 PRINCETON/KORNHAUSER RAILROAD NETWORK

NET 3 consists of 4 files: KORN76 (1976 accident/incident file plus geocoding information), LINK (information on links and hazardous material flows on each link, from the 1976 carload waybill statistics), NET-to-SPLC (file of NET 3 mode numbers and x, y coordinates).

Computer tapes: 1 tape, 800 BPI, ASCII.

Federal Railroad Administration One-Time 1976, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (854)  
ORDER FROM: Princeton University, Princeton, New Jersey, 08540

#### 12 322180

##### PHASE 17 REPORT ON STUDY OF CLASS 105A TANK CARS (CAR POPULATION AND ACCIDENT DATA ANALYSIS)

The overall objective of the RPI/AAR Phase 17 Study is to assess the safety of 105A cars and develop recommendations to improve their safety where justified. Most of the activities are being carried out in cooperation with the FRA. In the first phase of the study, car population data and accident data have been collected. The second phase which is just beginning, involves the mechanical impact and fire testing of various 105A constructions. This report is a data display report giving the results of the car population and accident survey. The test phase plan also is presented in this report, but the test results will be given later. This report specifically gives a breakdown of 105A car populations as of 11/1/79 by class of car and commodity. In addition, estimates of both the 105A and 112A(114A) car populations are given for the 14 and one-half year period 1965-mid 1979. Accident data for both classes of cars also are given for the same period. These accident data are then normalized on the basis of car population, the results being fairly quantitative measures of car performance. The results show that all 105A cars taken as a group behave significantly better than 112A(114A) cars. Class 105A500W chlorine cars are particularly good, whereas 105A200W cars in VCM service and cars carrying ethylene oxide behave relatively poorly.

An RPI-AAR Railroad Tank Car Safety Research and Test Project.

Phillips, E. Role, H

Association of American Railroads Technical Center Res Rpt.  
RA-17-1-43, AAR R-433, Feb. 1980, 34p, 1 Fig., 5 Tab., 3 Ref., 3 App.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

#### 12 322510

##### FIRE REMAINS A BIG POTENTIAL HAZARD

One of the main hazards that can occur on a metropolitan railway is to have a fire on board. Several metropolitan railways, including those in London, Hong Kong, San Francisco, Stockholm and New York, have made a study of non-flammable materials.

*International Railway Journal* Vol. 20 No. 5, May 1980, p 47, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013

#### 12 322544

##### REPORT OF THE TASK FORCE ON RAIL TRANSPORTATION OF HAZARDOUS MATERIALS

The Inter-Industry Task Force on Rail Transportation of Hazardous Materials was formed in March 1978. The Task Force, made up of executives representing the Chemical Manufacturers Association, the Association of American Railroads, the Chlorine Institute, the Compressed Gas Association, the National Liquefied Petroleum Gas Association, the Fertilizer Institute, and rail car manufacturers worked over a year in its efforts to accelerate rail safety programs and initiate steps designed to reduce the number and severity of rail transportation accidents involving hazardous materials. This Report presents accomplishments and a series of recommendations in the areas of accident response, transportation, equipment and systems safety analysis.

Association of American Railroads June 1979, v.p., 2 App.

ORDER FROM: AAR

DOTL RP

12 322546

**IMPLYING THE VALUE OF LIFE FROM PUBLIC SAFETY INVESTMENTS**

Many methods have been suggested for determining the value that should be given to a fatality when evaluating public investment decisions. This paper briefly reviews these methods and presents another method which is to infer a value from previous governmental decisions. The basis for and advantages of this method are explained and the potential problems in estimating an implied value are discussed. An example of its estimation, using past decisions on highway-railway crossing improvements, is then presented. While the estimation of implied values can be very difficult, it can be particularly useful for checking consistency in the allocation of resources to various public safety programs.

Byer, PH Bacchus, A Melcher, R  
Toronto-York University Joint Program in Transp Res Rpt. 64, No Date, 32p

ORDER FROM: Toronto-York University Joint Program in Transp, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario M3J 1P3, Canada

12 322947

**5 R'S OF HAZARDOUS MATERIALS TRANSPORTATION**

In recent years several state, municipalities, and carriers have adopted rules and regulations implementing the hazardous materials regulations of the Department of Transportation. In many instances, the implementation is more stringent and restrictive than the Federal regulations; consequently, shippers and carriers alike are experiencing problems in complying with a myriad of rules, regulations and procedures. This paper will examine those regulations and rules which have been adopted or are being considered for adoption by state and local regulatory bodies, carriers, and carrier associations; the restrictions, ramifications, and results of these actions on intra and inter state transportation of hazardous materials; and a discussion of possible remedies that are available to shippers. Specifically, these discussions will be directed primarily to the transportation of radioactive materials while recognizing that regulatory constraints affect all hazardous materials commerce to some degree. Collectively, the conservation efforts; and the continuing concern on the part of the general public, environmentalists and special interest groups about the alleged lack of control of hazardous material transport will also be examined in terms of the far-reaching effects on the nation's transportation system.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(Vol. 2).

Lamb, JA Blalock, LG Brooks, GB  
Department of Energy 1978, pp 831-836

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Department of Energy, Oak Ridge, Tennessee, 37830

12 322949

**URANIUM HEXAFLUORIDE CYLINDERS SURVIVE TRAIN DERAILMENT**

A serious train derailment took place in North Carolina in March of 1977. Two of the twenty-nine cars which went off the tracks carried radioactive materials in the form of natural uranium hexafluoride. The packaging for this low specific activity material is a 48 inch diameter by 12.5 foot long cylinder constructed of 5/8 inch thick steel. Each of the four cylinders contained approximately 12,500 kg. The cylinders were mounted on steel cradles which were securely fastened to trailers which in turn were riding on flatcars in standard piggyback fashion. All four of the trailers and cylinders were damaged. The condition of each cylinder immediately after the accident, the recovery and subsequent shipment to Oak Ridge, the receipt inspection and the final disposition of the cylinders and the contents are described in the paper. The immediate response of the media to the news that radioactive material was on the train resulted in a great deal of misinformation being disseminated. In contrast to the initial reports of leakage, there was no breach of the containers and no radioactive contamination of any kind. The National Transportation Safety Board has issued a report on the accident recommending development of guidelines for emergency response procedures.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(Vol. 2).

Teer, BR  
Transnuclear, Incorporated 1978, pp 612-614

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Transnuclear, Incorporated, 1 North Broadway, White Plains, New York, 10601

12 322950

**SAFE TRANSPORTATION OF RADIOACTIVE MATERIAL SHIPPING CONTAINERS INCLUDING ACCIDENT AND RESPONSE EXPERIENCE**

The safe transportation of radioactive material shipping containers requires the expertise of knowledgeable and concerned people. When accidents occur involving the transportation of these radioactive material shipping containers, prompt and efficient response to the needs of the accident situation by competent personnel is mandatory in order to minimize the hazards to which the general public might be exposed. This paper describes the emergency response and retrieval activities exercised following accidents which occurred during the transportation of three types of radioactive material shipping containers by three different modes of transportation: namely-motor freight, rail freight, and trailer on flat car (TOFC) service. There was no leakage or loss of material as the result of the accidents, nor was there any loss of life or injury to any persons in or near the accident sites.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 2).

Taylor, JC  
Union Carbide Corporation 1978, pp 602-611

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Union Carbide Corporation, Paducah, Kentucky, 42001

12 322951

**PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS**

The following topics are discussed in this volume; shielding and criticality; transportation accidents; physical security in transit; transport forecasting and logistics; transportation experience, operations and planning; regulation; standards and quality assurance; risk analysis; and environmental impacts. Separate abstracts are prepared for individual items.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(Vol. 2).

Sandia Laboratories 1978, 519p  
Contract EY-76-C-04-0789

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

12 322952

**CORRELATION OF EXPERIMENTAL SHIPPING CASK MODEL STRUCTURAL BEHAVIOR BY COMPUTER ANALYSIS**

As an aid in the planning and investigation of an experimental research program on the effects of environmental accidents upon spent fuel shipping containers, a study is being made to correlate the results of tests of scale model shipping casks with those of complex structural computer models. After surveying the available codes, a general purpose, dynamic, nonlinear computer program (ADINA) was chosen to model several experiments. Among these are: stainless steel cylindrical containers dropped on end from a height of 12 inches; lead and uranium filled cask models dropped 12 inches and 30 feet, in both end and side orientations. The results will be used for selection of the test parameters by the prediction and planning of failure test conditions, as well as confirmation of previous test results. Together, the experimental and theoretical analyses will provide a realistic assessment of the effects of accident loadings on spent fuel shipping containers.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 1).

Balmert, M Groom, J  
Battelle Columbus Laboratories 1978, pp 375-383

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio, 43201

12 322953

**GOVERNMENT'S DUTY, AS SHIPPER AND REGULATOR, TO KEEP SPENT FUEL AND WASTE ON TRACK: THE ICC CASES**

The transportation of radioactive materials, particularly spent nuclear fuel and radioactive waste, is at once the most studied and the most misunder-



stood category of hazardous materials transportation. During recent years, agencies of the United States Government have expended substantial effort and money not only studying many aspects of nuclear materials transportation but also litigating the safety and economics of such transportation. The movement of such materials has been attacked, not only by some state and local organizations, but also, by senior members of the transportation industry-the nation's railroads. This paper will discuss the government's role in the litigation which has developed between the railroad industry on one side and the government and the nuclear industry on the other. For more than two years, the Department of Energy has joined with representatives of other government agencies and the nuclear industry in an effort to preserve the viability of rail transportation of radioactive materials under reasonable common carrier tariffs. The southern and western railroads had restricted such transportation by requiring spent fuel and radioactive waste to move only in special trains. The eastern railroads and some midwestern roads had refused any common carriage for these commodities. Because tariff rates or the absence of such rates sparked this controversy, the United States Interstate Commerce Commission became the tribunal to hear these cases in the first instance. The issues heard included the adequacy of current safety requirements including packaging, testing and insurance. By the end of 1977, the ICC had issued initial decisions striking down the restrictive tariffs and ordering publication of tariffs where none existed. The litigation, however, will not be finally concluded for some time.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 1).

DiStefano, J  
Department of Energy 1978, pp 180-185

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Department of Energy, 1000 Independence Avenue, SW, Washington, D.C., 20585

#### 12 322955 VITAL LINE

The need for increased coordination in the transport of radioactive materials and the government's role in this area are discussed in this lecture. The development of a systems approach to standardize shipping casks' design and fabrication is needed. Industrial technology in these areas is appraised. Public acceptance of nuclear shipments or the safety of those shipments is also discussed.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 1).

Cunningham, GW  
Department of Energy 1978, pp 3-7

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Department of Energy, 1000 Independence Avenue, SW, Washington, D.C., 20585

#### 12 322956 PACKAGING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

The presentations made at the Symposium on Packaging and Transportation of Radioactive Materials are included. The purpose of the meeting was for the interchange of information on the technology and politics of radioactive material transportation. Separate abstracts were prepared for individual items.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 1).

Sandia Laboratories 1978, 547p  
Contract EY-76-C-04-0789

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

#### 12 325430 VANDALISM: TIME TO CRACK DOWN

Vandalism is a continuing problem for railroads despite educational and police campaigns by the industry and individual railroads. Automobile rack cars are the most frequent targets of vandals. Vandalism incidents involving the Florida East Coast are described, along with steps taken to protect the railroad's property. Glazing standards have been imposed by FRA on locomotives, passenger cars and cabooses to protect passengers and crews from projectiles fired and objects thrown at trains.

Miller, LS *Railway Age* Vol. 181 No. 24, Dec. 1980, pp 54-56, 1 Phot.

ORDER FROM: ESL

DOTL JC

#### 12 325734 A REPORT ON INVESTIGATIONS INTO RAIL PASSENGER SAFETY

Investigations are made into issues affecting rail passenger safety in intercity and commuter rail service. The objectives of the study were to identify important safety issues that need resolution, to describe means for resolving these issues, and to describe further research that is critically needed. Special attention was given to those issues highlighted by the National Transportation Safety Board (NTSB) in recent recommendations. The important safety issues identified are briefly described as communications, train control systems, vehicle crashworthiness, vehicle interior design, emergency egress and lighting, equipment maintenance and inspection, and employee training.

Mattison, PD Palmer, DW Nayak, PR  
Little (Arthur D), Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-80/65, ADL-80589-30, Oct. 1980, 93p, Figs., 4 Tab., 4 App.

Contract DOT-FR-74261

ORDER FROM: NTIS

PB81-116196, DOTL NTIS, DOTL RP

#### 12 325746 ANALYSIS AND MODEL TESTING OF A SUPER TIGER TYPE B WASTE TRANSPORT SYSTEM IN ACCIDENT ENVIRONMENTS

Sandia National Laboratories is investigating the response of a Type B packaging containing drums of contact-handled transuranic waste (CH-TRU) as a part of a program to evaluate the adequacy of experimental and analytical methods for assessing the safety of waste transport systems in accident environments. A US NRC certified Type B package known as the Super Tiger was selected for the study. This overpack consists of inner and outer steel shells separated by rigid polyurethane foam and can be used for either highway or rail transportation. Tests using scale models of the vehicular system are being conducted in conjunction with computer analyses.

From ANS International Conference; Washington, D.C., November 17, 1980, CONF-801107-10.

May, RA Yoshimura, HR Romesberg, LE Joseph, BJ  
Sandia Laboratories 1980, 4p

Contract AC04-76DP00789

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

#### 12 325747 TRECII: A COMPUTER PROGRAM FOR TRANSPORTATION RISK ASSESSMENT

A risk-based fault tree analysis method has been developed at the Pacific Northwest Laboratory (PNL) for analysis of nuclear fuel cycle operations. This methodology was developed for the Department of Energy (DOE) as a risk analysis tool for evaluating high level waste management systems. A computer package consisting of three programs was written at that time to assist in the performance of risk assessment: ACORN (draws fault trees), MFAULT (analyzes fault trees), and RAFT (calculates risk). This methodology evaluates release consequences and estimates the frequency of occurrence of these consequences. This document describes an additional risk calculating code which can be used in conjunction with two of the three codes for transportation risk assessment. TRECII modifies the definition of risk used in RAFT (prob. x release) to accommodate release consequences in terms of fatalities. Throughout this report risk shall be defined as probability times consequences (fatalities are one possible health effect consequence). This methodology has been applied to a variety of energy material transportation systems. Typically the material shipped has been radioactive, although some adaptation to fossil fuels has occurred. The approach is normally applied to truck or train transport systems with some adaptation to pipelines and aircraft. TRECII is designed to be used primarily in conjunction with MFAULT; however, with a moderate amount of effort by the user, it can be implemented independent of the risk analysis package developed at PNL. Code description and user instructions necessary for the implementation of the TRECII program are provided.

Franklin, AL  
Battelle Memorial Institute/Pacific Northwest Labs May 1980, 89p

Contract AC06-76RL01830

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

12 325752

**TRANSPORT OF DANGEROUS MATERIALS [Les transports de matieres dangereuses]**

This dossier describes the developments in technical regulations with regard to the transport of new materials. The regulations are updated by the Interministerial Committee for Transport of Dangerous Materials, whose role, origin and composition are described. The design of vehicles for transporting dangerous materials is also the subject of regulation. A provisional road routing for the transport of dangerous materials has been tested in Moselle. The special case of the transport of radioactive material is dealt with. The regulations also provide for professional training in the transport of dangerous materials. [French]

Dobias, G Thibault, HB Marrec, P *Bulletin des Ponts et Chaussees et des Mines* No. 3, Mar. 1979, pp 12-31, 12 Fig., 2 Tab., 15 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 105807), Central Laboratory of Bridges & Highways, France, Institute of Transport Research  
ORDER FROM: Central Laboratory of Bridges & Highways, France, 58 Boulevard Lefebvre, 75732 Paris, France

12 325931

**DECISION MAKING IN HAZARDOUS MATERIALS TRANSPORTATION**

Reviews some of the countless methods of risk analysis/risk assessment to make effective judgments of the safety of the movement of particular cargoes.

Luckritz, RT Schneider, AL *Journal of Hazardous Materials* Vol. 4 No. 2, Sept. 1980, pp 129-143, Tabs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, Netherlands

DOTL JC

12 326035

**IDENTIFICATION OF THE FIRE THREAT IN URBAN TRANSIT VEHICLES**

To improve mass transportation, UMTA tasked the Transportation Systems Center (TSC) to assess the overall fire threat in transit systems and to identify and recommend suitable remedial actions. This report presents the identification of the fire threat in urban transit vehicles. The study is based on site visits/surveys to nine representative U.S. transit properties, namely: Massachusetts Bay Transportation Authority (MBTA); Bay Area Rapid Transit District (BART); New York City Transit Authority (NYCTA); San Francisco Municipal Railway (MUNI); Southern California Rapid Transit District (RTD-Los Angeles); Denver Rapid Transit District (RTD-Denver); Metropolitan Atlanta Rapid Transit Authority (MARTA); Washington Metropolitan Area Transit Authority (WMATA); and Chicago Transit Authority (CTA). The data collected from the nine transit properties represented all bus and rail rapid transit fire and smoke incidents which occurred at those transit properties during the calendar year 1978. Data was obtained from daily logs, operator reports, accident reports, police reports, and maintenance reports. These data are supplemented by fault tree diagrams and scenarios in identification of the fire threat. These are based on actual transportation fire and smoke incidents in TSC files, data analysis, interviews with transit personnel, and the use of maintenance manuals. Following a description of the TSC data acquisition methodology, the data are analyzed and discussed along with the relationship of the fault trees and scenarios to the identification of countermeasures.

Hathaway, WT Flores, AL  
Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA-80-8, UMTA-MA-06-0051-80-1, June 1980, 109p

Contract DOT-MA-06-0051

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-217631

12 326136

**REVIEW AND INTEGRATION OF EXISTING LITERATURE CONCERNING POTENTIAL SOCIAL IMPACTS OF TRANSPORTATION OF RADIOACTIVE MATERIALS IN URBAN AREAS**

The symbolic interactionist/collective behavior approach within sociology is applied to the transport of radioactive materials through urban environs, indicating that social impacts of such transport would extend far beyond objectively measurable radiological impacts of normal (incident free) transport, accidents during transport (with or without radiation release) or diversion by terrorists. This approach is used to delineate the major cultural frames of reference that interested publics and special groups might use in interpreting events surrounding radioactive material transport, and to specify probable social impacts of seven scenarios. These impacts include: (1) uncertainty, fear and mistrust, (2) processes, (3) initial agency responses, (4) subsequent collective behavior responses, and (5) a wide range of more general impacts on U.S. culture and special structure.

Prepared in cooperation with Texas Univ. at Houston. School of Public Health., and Rice Univ., Houston, TX.

Gordon, C Anderson, C Gessell, TF Prichard, H  
Sandia Laboratories, Nuclear Regulatory Commission SAND-78-7017, July 1980, 180p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NUREG/CR-0742

12 326171

**RAILROAD ACCIDENT REPORTS-BRIEF FORMAT, ISSUE NUMBER 3, 1978**

The publication contains briefs of selected railroad accidents occurring in U.S. railroad operations during fiscal years 1977 and 1978. The brief format presents basic facts, conditions, circumstances, and probable cause(s) in each instance. Additional statistical information is tabulated by types of accidents, and casualties related to types of accidents, carriers involved, and causal factors.

National Transportation Safety Board NTSB-RAB-80-1, Jan. 1980, 167p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-200983, DOTL NTIS

13 318972

## PERSONNEL SAFETY ON ELECTRIFIED RAILROADS

Potential electrical hazards to fire, police, and rescue personnel responding to emergencies on electrified railways are examined. Data on descriptions of electrical facilities, types of accidents and danger to emergency personnel, and reviews of operating procedures have been obtained during a series of visits to electrified rail and transit systems. Programs to reduce electrical hazards to emergency personnel are proposed. These programs are evaluated by a cost-benefit comparison, and recommendations are selectively made. Joint development of emergency operating plans by rescue and railroad organizations, and installation of direct telephone lines to the power director are recommended as being most cost-effective.

Prepared in cooperation with Kusko (Alexander), Inc., Needham, MA.

Abbas, JD Phillips, WE, Jr Kusko, A King, CM  
Transportation Systems Center, Federal Railroad Administration Final  
Rpt. FRA/ORD-80/36, DOT-TSC-FRA/80-14, June 1980, 60p

Contract DOT-TSC-1180

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-220858, DOTL NTIS

13 319968

## SZD EXPERIMENTS ON THE PROTECTION OF INSTALLATIONS AND STRUCTURES FROM ELECTRICAL CORROSION DUE TO LEAKAGE CURRENTS [Erfahrungen der SZD beim Schutz von Anlagen und Konstruktionen vor Elektrokorrosion durch Irrströme]

The writer describes some SZD experiments concerning the protection of cables and piping, catenary masts and other reinforced concrete equipment against electrical corrosion. He also discusses the protection of rails and rail fasteners in tunnels. [German]

Kotel'nikov, A Zeitschrift der OSShD Vol. 23 No. 1(129), 1980, pp 11-19, 7 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

13 319970

## THE INSULATION OF THE NEW HIGH SPEED "ROME-FLORENCE" LINE USING PLASTIC MATERIAL [La Direttissima e isolata in plastica]

The article is devoted to the use of new plastic insulators between the catenary and the metallic supports, on the new Rome-Florence line. It also deals with glass resin and porcelain compound insulators and Isoflons which replace the I-489 insulators used on conventional electrified lines. [Italian]

Also covered in No. 12, December 1979 issue, pages 31-33.

Polvera, A *Tecnica Professionale* No. 11, Nov. 1979, pp 2-6, 18 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Collegio Ingegneri Ferroviari Italiani, Via Giolitti 34, Rome, Italy

13 319971

## ELECTRICITY, ELECTRICAL ENGINEERING AND RAILWAYS [Elektrizitaet, Elektrotechnik und Eisenbahnen]

In the general information, the application of electrical engineering to the railways is the main subject discussed. At the outset it was only used for signalling and telecommunications. The invention of the dynamo brought about a wider application of electrical technology leading to Werner von Siemens' introducing electric traction on the railways. The trials and the failures are described and the different systems of traction current and the present state of knowledge are discussed. [German]

Bauermeister, K *Glaser's Annalen ZEV* Vol. 104 No. 1, Jan. 1980, pp 6-9

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

DOTL JC

13 319972

## PANTOGRAPHS FOR ELECTRIC TRACTIVE UNITS ON THE BDZ AND WAYS OF REDUCING THEIR DETERIORATION [Pantografi na elektriceskija tjagov podvizen s"stav na BDZ BDZ v"zmoznosti za namaljavane na tjahnata avarijnost]

The author describes construction details, mechanical parameters and the main features of different types of pantograph. After analysing the deterioration of pantographs and catenaries in detail the author proposes a number of solutions. [Bulgarian]

Pomakov, L *Železpaten Transport* No. 1, 1980, pp 15-20

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ministry of Transport, 9-11 Levski Street, Sofia, Bulgaria

13 319987

## A METHOD FOR REAL CALCULATION OF THE LOADING OF OVERHEAD LINES

With continuing electrification, the processes have been updated for dimensioning overhead lines and calculating the influence of parallel cables, taking into account predicted traffic densities. Considering projected train schedules, the temperature of the contact wire, the current at feeder points, current in the catenary, and line losses are calculated with the new method. [German]

Semrau, M *DET Eisenbahntechnik* Vol. 28 No. 6, June 1980, pp 224-225

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

13 322005

## FUTURE ROLE OF RAILROAD ELECTRIFICATION

A study has been performed of the future feasibility and impacts of a national railroad electrification network in the Southwestern United States. The proposed national network would range from 21,418 and 41,999 route-miles, of which 31 to 37 percent would be in the nine Southwestern states. Energy savings of the proposed network have been analyzed along with potential environmental benefits of national importance. Substantial reductions in air pollutant emissions would result by conversion of diesel to electric trains for freight and passenger movements, with up to a 500,000 tons per year reduction in hydrocarbons. Even greater reductions in air pollution emissions would be obtained by intermodal diversion from diesel trucks to electric trains, with more than a million tons per year reduction in nitrogen oxides emissions.

Changing Energy Use Futures, International Conference on Energy Use Management, 2nd, Los Angeles, California, October 22-26, 1979. Volume 4.

Cooper, HBH, Jr (Texas University, Austin); Buck, RJ  
Pergamon Press, Incorporated Conf Paper 1979, pp A37-A54, 49 Ref.

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

13 322022

## CONTRIBUTION TO UNDERSTANDING THE OSCILLATIONS OF AN OVERHEAD CONTACT SYSTEM FOR ELECTRIC RAILROADS [Beitrag zum Verstaendnis des Schwingungsverhaltens eines Fahrdrabt-Kettenwerkes]

Using d'Alembert's method of treating the wave equation, a new analytical theory is developed to describe the oscillations of a catenary (and the mechanical waves travelling on it and reflected by discontinuities), for instance excited by a moving pantograph. This theory is used to evaluate experiments, which were performed by British Railways but which could not be satisfactorily interpreted. [German]

Bucksch, R *ÄEG-Telefunken. Wissenschaftliche Berichte* Vol. 52 No. 5, 1979, pp 250-262, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

13 322025

## STRAY CURRENTS: CORROSION AND MEANS OF PROTECTION [Courants vagabonds: Corrosion et moyens de protection]

After pointing out the originality of return circuits for electric traction currents, the article reviews the various types of corrosion encountered in a

railway environment. The process of electrolytic corrosion by stray currents which has been observed only along de-electrified tracks is described. The various passive and active methods to protect rails and pipes from corrosion are recalled, in particular the system of cathodic protection by electric polarized drainage, generalized by the SNCF. Some examples of cathodic protection installations are given. [French]

Hocquet, R (French National Railways) *Revue Generale de l'Electricite* Vol. 89 No. 1, Jan. 1980, pp 23-36

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

### 13 322521

#### HEATING AND THERMAL LOADING CAPACITY OF OVERHEAD CONTACT LINES OF ELECTRIC RAILWAYS [Erwaermung und thermische Belastbarkeit von Fahrleitungen elektrischer Bahnen]

Bases of the thermal behavior of overhead contact lines. Deduction of the heating equation. Determination of the temporary loading capacity. Simulation of random loading. [German]

Schmidt, P *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 27 No. 1, 1980, pp 123-133, 6 Fig., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

### 13 322549

#### TOUGH ENVIRONMENT DICTATES STANDARDS OF ELECTRIFICATION

This year Moroccan Railways will inaugurate electric traction on the first section of the phosphates artery from Banguerir serving the port of Safi. The catenary will reach Safi next year, by which time ONCFM expects to be wiring up the new line from Nousseur to the port of Jorf Lasfar. Electrification of other routes is being given serious consideration in the face of high energy costs, but in the immediate future ONCFM is grappling with the problem of marine and industrial corrosion on fixed equipment. Experiments have been conducted with radio remote control in an effort to raise throughput on the phosphates routes.

Azouaoui, Y *Railway Gazette International* Vol. 136 No. 6, June 1980, p 501, 8006

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

### 13 322924

#### THE ENERGY CRISIS AND ELECTRIFICATION POLICY ON THE RENFE [La crisis energetica y la politica de electrificacion de RENFE]

The author analyses the effects of the energy crisis on the transport sector in Spain. He justifies the use of electrical energy in railway traction and comments on the RENFE Electrification Plan for 1974-1979, and future prospects as outlined in the General Railway Plan for 1980/1991. [Spanish]

Oliveros Rives, F *AIT-Revista* No. 33, Mar. 1980, pp 5-15

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

### 13 322927

#### A HISTORY OF ELECTRIC TRACTION. VOLUME 1: FROM THE BEGINNINGS TO 1940 [Histoire de la traction electrique. Tome 1: des origines a 1940]

A detailed history of the various electric traction techniques in Europe and America, showing clearly the different concepts and main periods in this method of traction. Volume 1 corresponds roughly to the period of the d.c. dynamo, then that of the a.c. transformer. [French]

Machefert-Tassin, Y *Vie du Rail* SNCF Cat 348 P 2 I, 1980, 562p, Figs., Photos., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: French National Railways, 610 Fifth Avenue, New York, New York, 10020

### 13 322960

#### RAILROAD ELECTRIFICATION IN AMERICA'S FUTURE: AN ASSESSMENT OF PROSPECTS AND IMPACTS. FINAL REPORT

Such considerations as the level of traffic, the relative financial health of individual railroads, the capacity of the associated supply and engineering/construction industries, and the logical connecting points at classifying yards, as well as the national interest value of creating a continuous system, continental in scope, were used to construct a scenario for railroad electrification that closely approximates how an electrification program might be implemented. For the economic reasons cited, much of the US railroad system would remain conventionally powered. This scenario provides for an electrified network involving 14 mainlines operated by 10 companies that could transport much of the nation's rail-borne freight. Five years of planning and engineering work would be required for each link before construction could begin. With 1000 miles or less of electrified route per year, 14 years would be needed to construct the 9000-mile network of our scenario. (The scenario constructed runs from 1980 to 1998.) The analysis was aided with the construction of the SRI Railroad Industry Model. Basically a model of industry operations and finances, the model produces income statements and balance sheets at yearly intervals. Railroad energy costs, railroad freight levels, maintenance costs, purchases and leases of rolling stock, electrification facility investments, future inflation, rate setting practices, annual depreciation, taxes, and profits were calculated.

White, RK Yabroff, IW Dickson, EM Zink, RA Gray, ME Moon, AE  
SRI International Jan. 1980, 175p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

SAN-1176-T4

### 13 322989

#### CLARIFICATION OF THE EFFECTS OF THE 50-60HZ SWITCHING EQUIPMENT ON THE ATC SYSTEM IN SHINKANSEN (SUPER-EXPRESS TRAIN)

While the electric current on the Tokaido Shinkansen is 60 hertz, extensions of this network are to be powered at 50 hertz. Where these routes connect, 60Hz and 50Hz sections will adjoin each other. The author studied some problems concerning power switching at such points, taking into consideration stray currents, electromagnetic induction and direct magnetic fields. This paper describes how to minimize stray and inductive currents and how to switch the feeder circuits with high reliability. Theoretical and quantitative results are included.

Ishikawa, K *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 2, June 1980, pp 80-85, 9 Fig., 4 Tab., 1 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

### 13 323186

#### REVIEW OF MAIN LINE ELECTRIFICATION: INTERIM REPORT

This is the broad financial appraisal of British Rail's operations and profitability over the next 25 years as well as the implications of continuing electrification. Five options of increased coverage of the catenary are considered, bringing in the main factors bearing on costs. The BR/Department of Transport Steering Group has concluded that the results of this financial study are favorable and a more detailed analysis is under way. A mathematical model is used to compare costs of each option, varying the mixes of diesel and electric traction possible and necessary with each.

British Railways Board 1979, 42p, 2 Fig., 18 Tab., 3 App.

ORDER FROM: Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, England

DOTL TF858.G7G83

### 13 323225

#### THE FORMATION OF ICE ON ELECTRICAL CONDUCTORS DURING HEAVY FALLS OF WET SNOW

An example is described of severe disruption to electricity supplies caused by the freezing of wet snow on conductors, and an explanation is offered of the freezing mechanism. The same mechanism is used to account for the freezing of wet snow on locomotive pantographs on electrified main lines.



Kemp, AK *Meteorological Magazine* Vol. 109 No. 1292, Mar. 1980, pp 69-74

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Her Majesty's Stationery Office, Liaison Officer, Atlantic House, London SE1 9NH, England

DOTL JC

13 323232

## NEW CONDUCTOR RAIL DESIGN

A conductor rail of revolutionary design is now the subject of a manufacturing feasibility study by two British companies. It could be commercially available by 1984. The rail is free from icing problems and designed for use on very high speed inter-city routes as well as urban railways.

Ogilvie, JR *International Railway Journal* Vol. 20 No. 8, Aug. 1980, p 38

ACKNOWLEDGMENT: International Railway Journal  
ORDER FROM: ESL

DOTL JC

13 324413

## SECONDARY CONSUMERS OF ELECTRIC ENERGY IN THE OPERATION OF THE WEST GERMAN RAILROAD SYSTEM. TRAIN-HEATING EQUIPMENT AND POINTS HEATING INSTALLATIONS--1, 2 [Elektrische Nebenverbraucher im Betrieb der DB Zugvorheizungen und Weichenheizungen--1, 2]

Electric train pre-heating equipment and points heating installations within the operational field of the West German Railroad System are not only remarkable with regard to the power supply, but also impose versatile requirements on the designer with regard to the local operation and maintenance. The requirements of the operation for automatically working installations and an almost maintenance-free technique have led to corresponding developments in this field during the past ten years. Therefore the modern installations are not only highly reliable in service, but they require also for their operation only a small staff and can be economically maintained due to their uniform and simple structure. [German]

Scheider, K *Elektrische Bahnen* Vol. 78 No. 2, Feb. 1980, pp 75-84, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

13 324414

## APPLICATION OF MODERN DATA PROCESSING TECHNIQUES TO TRACTION POWER SUPPLY [Einsatz Moderner Datentechnik in der Bahnstromversorgung]

The general processes in a hv electric power network are summarized, with emphasis on the load distribution and operation. The optimization of load distribution with the aid of computers is discussed, along with practical solutions and the associated hardware and software. Future aspects are considered. [German]

Niekamp, K *Elektrische Bahnen* Vol. 78 No. 2, Feb. 1980, pp 46-48, 2 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

13 324493

## ELECTRIFICATION TALK IS GETTING MORE SERIOUS

Interested railroads are ready to work with FRA to study how a nationwide network of electrified lines could be shaped, financed and operated. The primary goal would be fuel security for U.S. transportation. An FRA conference in Kansas City brought together representatives of U.S. railroads that have already studied electrification and others becoming interested in the wake of fuel price increases. FRA has studied a 26,000-mile system of lines carrying the heaviest traffic which could be electrified for \$15 billion and would save \$1.5 billion annually. Four government/industry task forces may look at the configuration of the electrified system; its financing; technical and operating elements; and institutional factors such as environmental impact.

*Railway Age* Vol. 181 No. 22, Nov. 1980, p 26

ORDER FROM: ESL

DOTL JC

13 324499

## ENERGY AND ENVIRONMENTAL FACTORS IN RAILROAD ELECTRIFICATION

U.S. railroads have not proceeded with electrification primarily because of economics--the large capital investment required and the difficult financial condition of many railroads. Fuel issues were not critical with diesel fuel being relatively inexpensive and in abundant supply. Standardization produces low-cost diesel-electric motive power. The needs of national energy policy and increasing cost and scarcity of liquid fuel, along with changing government attitudes and an evolving national transportation policy, are creating conditions that can revive U.S. interest in electrification. For railroads any decision to electrify will depend on economic considerations. National interest in other critical areas, however, may give added impetus to the process. This presentation concentrates on two such areas--energy and the environment--with emphasis on electrification's potential for alleviating the nation's energy problems.

Swanson, CB Vogel, HH  
Mitre Corporation Sept. 1975, 81p, Figs.

ORDER FROM: Mitre Corporation, 1820 Dolley Madison Boulevard, McLean, Virginia, 22102

DOTL RP

13 324910

## ELECTRIC OPERATION OF TRAINS OF THE WEST GERMAN RAILROAD SYSTEM IN 1979 [Der Elektrische Zugbetrieb der Deutschen Bundesbahn im Jahre 1979]

Outstanding events in the field of electric traction in 1979 are reported, along with relevant technical data. A survey is presented of electrified lines, including dates when they became operational and with the lines actually being equipped. Stock numbers, deliveries and orders of electric motive units are pointed out as well as their structure. A description is given of the state and further development of traction power supply facilities. [German]

Bauermeister, K *Elektrische Bahnen* Vol. 78 No. 1, Jan. 1980, pp 2-16

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

13 324937

## SYSTEM FOR THE ACCURATE CALCULATION OF ENERGY LOSSES IN A DIRECT CURRENT TRACTION NETWORK [Verfahren zur genauen Berechnung der Energieverluste in einem Gleichstrom-Traktionsnetz]

To estimate regenerative braking performance it is necessary to evaluate what amounts of energy can be saved. Losses in the fixed equipment are examined first of all. In the urban railway system studied there was found to be little difference between operating with or without regenerative braking as far as losses in the supply system and the return current were concerned. If, with the regenerative braking system the return current cannot be used by trains on the same section of overhead line, much greater losses are to be expected. Practically 30 to 48 percent of the energy used during acceleration can be recovered during regenerative braking. [German]

Heijst, T Hamels, D *Elektrische Bahnen* Vol. 78 No. 7, July 1980, pp 170-179, 9 Phot., 9 Ref.

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

DOTL JC

13 324938

## 110-KV TRACTION CURRENT LINES--USE OF A MODERN TECHNIQUE IN THE INSTALLATION OF OVERHEAD CONTACT LINES FOR THE NEW MANNHEIM-STUTTGART LINE [110-kV Bahnstromleitung--Einsatz moderner Technik im Freileitungsbau fuer die Neubaustrecke Mannheim-Stuttgart] No Abstract. [German]

Barthel, S *Eisenbahningenieur* Vol. 31 No. 7, July 1980, pp 289-294, 7 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

13 325445

**TRACTION SUPPLY INTO LIVERPOOL STREET CHANGES TWICE**

Despite the economic supremacy of high-voltage AC, medium voltage DC catenary is still widespread in many countries. When British Rail converted lines east of London from 1.5 kV DC to 50 Hz AC in 1960, a dual-voltage 25/6.25 kV system was adopted to keep the cost of conversion down. Subsequent work has reduced clearance specified for 25 kV so that conversion of former 1.5 kV DC overhead equipment to the higher voltage became practicable and BR expects to eliminate 6.25 kV by 1984.

Blake, DC *Railway Gazette International* Vol. 136 No. 12, Dec. 1980, p 1059, 4 Fig.

ORDER FROM: ESL

DOTL JC

13 325742

**ECONOMICS OF ELECTRIC ENERGY AND RELIABILITY OF ELECTRIC POWER SUPPLY EQUIPMENT [Ekonomija elektroenergij i nadeznost' ustrojstv elektrosnabzenija]**

The Moscow network has done research to find reserves of electric energy and to upgrade power stations on high capacity lines carrying heavy trains from 6 to 10,000 tons. In particular, contact line sections and catenary joints were calculated and verified under heating conditions, level of voltage and thermal resistance of the starting feeders. [Russian]

Tihonov, AS *Elektricheskaya i Teplovoznaya Tiaga* No. 7, 1980, pp 42-43

ACKNOWLEDGMENT: International Union of Railways, BD

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

13 325744

**EPRI'S ROLE IN RAILROAD ELECTRIFICATION**

A national commitment with appropriate funding is needed before railroad electrification can play a significant role in the transportation sector. The Electric Power Research Institute (EPRI) and US utilities are interested in the opportunity to use rail rights-of-way for towers and the possibility of reducing the costs of coal transport. Electrification will become more cost-effective as oil prices rise, but only one percent of US railroads are presently electric. EPRI's role will be to help develop techniques for utilities to forecast load and supply needs, eliminate electronic interference, and reduce the costs of an electrification program.

*Journal* Vol. 5 No. 6, July 1980, 28p

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Electric Power Research Institute, Box 10412, 3412 Hillview Avenue, Palo Alto, California, 94303

13 325887

**RAILROAD ELECTRIFICATION IN THE PACIFIC AREA**

Several Pacific area countries, at different levels of development, have recently installed extensive railroad electrification in response to the increasing scarcity and high cost of diesel fuel. Japan is the leader in the region, with nearly half its rail network electrified. As in Japan, European railroads have been extensively electrified, and recent designs now form the basis for applications worldwide. Current electrification programs in Pacific area countries are described, as well as future plans. Three factors are expected to generate even more extensive railroad electrification in many Pacific countries: higher fuel prices, increasing traffic levels, and improved electrification system designs.

Proceedings of the Special Conference-Broadening Horizons, Transp and Dev Around the Pacific, Honolulu, Hawaii, July 21-23, 1980.

Weiss, WD

American Society of Civil Engineers 1980, pp 117-128

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE

13 325897

**CURRENT COLLECTION AT CONTACT LINES BY CONTROLLED TROLLEYS [Stromabnahme von Fahrleitungen ueber Gesteuerte Stromabnehmer]**

The high-speed electric-drive rail cars are usually provided with the trolley powering, since this solution is both economical and compatible with the existing systems. However, a considerable improvement of the dynamic

characteristics of the line/trolley system is required. The paper discusses some of the solutions. [German]

Hammerschmidt, H (Technical University of Munich, West Germany) *Messen und Pruefen* Vol. 15 No. 12, Dec. 1979, pp 968-971, 7 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Hans Holzmann Verlag KG, Gewerbestrasse 2, Postfach 460, 8939 Bad Woerishofen, West Germany

13 325918

**SZD RESEARCH INTO THE USE OF POLYMERS FOR OVERHEAD CONTACT LINES [Untersuchungen der SZD zur Anwendung von polymeren Materialien im Fahrleitungsnetz]**

No Abstract. [German]

Goroskov, JI Luk'Janov, AM *Zeitschrift der OSSHd* Vol. 23 N3-131, 1980, pp 9-12, 5 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

13 325924

**PREVENTION OF DAMAGE CAUSED BY BIRDS TO INSULATORS [Preduprezhdenie perekrytij izoljacii pticami]**

Analysis of overhead line defects caused by birds that nest in the masts. Results of tests carried out by the USSR Rail Transport Research and Study Institute in 1978-1979 on: preventing and restricting nesting; preventing burns to the main carrying cable; preventing damage to rod insulators. There is a description of the installations to cut overhead line defects. [Russian]

Beljaev, IA *Elektricheskaya i Teplovoznaya Tiaga* No. 7, 1980, pp 44-46, 7 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

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

13 325935

**STUDY OF PROBLEMS RELATED TO ELECTRIC ENERGY SUPPLY TO MAIN FREIGHT RAILWAY ROUTES [Etude de problemes lies a la fourniture d'energie electrique aux grandes voies ferrees destinees au transport de marchandises]**

Method of calculation for evaluating the effects of imbalance in the voltage and return currents in the supply to main railway lines used for the transport of long heavy trainloads of ore in Africa and South America. [French]

Lemal, B *Societe Royale Belge des Electriciens. Bulletin* Vol. 96 No. 2, 1980, pp 78-83, 4 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Koninklijke Belgische Vereniging der Electrotechn, Place du Trone, B-1000 Brussels, Belgium

13 329543

**CONVERTERS FOR SUPPLYING ELECTRIC POWER TO THE 16 2/3-HZ RAILROAD NETWORK [Umrichter zur Speisung des 16 2/3-Hz-Bahn-Netzes]**

For hv dc transmission, reliable thyristors have been developed. This starting point gave the impulse for a renewed consideration of supplying single-phase ac railroad lines from the public three phase distribution network by means of converters. A converter with intermediate dc circuit for supplying the railroad hv distribution network is discussed. The intermediate circuit guarantees a low level of interference between the two connected networks; any action of the 33 1/3 Hz working oscillation on the three-phase network is being suppressed to a large extent. The design of the plant and the signal processing device enable the operation of the converter as a control device in combined voltage and frequency control for the single-phase network. Working characteristics and installation costs are considered. [German]

Hoening, J *Elektrische Bahnen* Vol. 78 No. 4, Apr. 1980, pp 92-97, 12 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

13 329544

**DIESEL RAILROAD VEHICLE FOR THE MAINTENANCE OF THE OVERHEAD LINE OF THE STATE RAILROAD SYSTEM IN TAIWAN [Dieseltriebwagen fuer die Fahrleitungsunterhaltung bei der Taiwanischen Staatsbahn]**

Diesel-operated vehicles are described which were delivered on the occasion of the completion of the first electrification project in Taiwan. This project covers a distance of 865 km. Electric and mechanical characteristics are outlined. It is claimed that these vehicles will provide inexpensive but reliable maintenance. [German]

Grimrath, H (Bundesbahn-Zentralamt Minden) *Elektrische Bahnen* Vol. 78 No. 4, Apr. 1980, pp 100-103, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

13 329545

**INSTALLATION OF A MOVABLE SWITCHING STATION IN LANGENFELD, WEST GERMANY [Errichtung eines fahrbaren Schaltpostens in Langenfeld]**

With the increasing interconnection of the overhead line network and the electric energy demand at the junction points, a power balance by switching points is necessary in order to avoid voltage differences. This has been realized by a switch plant which is installed, together with the auxiliaries and the protection and remote action equipment, within a converted passenger coach. This mobile switch plant can be utilized within the range of the railroad electric power supply and distribution serving as a switching point with up to four overhead line branches or as a paralleling point. [German]

Stahnke, E Spillmann, W *Elektrische Bahnen* Vol. 78 No. 4, Apr. 1980, pp 104-107, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

13 329548

**ELECTRIC RAILWAYS--INCREASINGLY IMPORTANT TRANSPORT ARTERIES**

An examination is made of the general characteristics of rail transport, application areas for ac and dc operated systems, information and control technology, signaling equipment, electronic data processing for rail management; and, transportation systems of the future.

*Siemens Review* Vol. 46 No. 6, Nov. 1979, pp 6-11

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

13 329946

**CORROSION RESISTANCE AND DURABILITY OF MATERIALS FOR OVERHEAD EQUIPMENT IN THE UNDERSEA TUNNEL**

Overhead electrical contact systems experience corrosion, along with other service-induced damage. Causes for the corrosion of trolley wire and metal fittings were determined in the course of a 7-year test in a tunnel environment and also in an industrial atmosphere. Specimens included wire strands; metal fittings; their combinations; specimens of metal alloys for corrosion and fatigue tests; polymeric materials; and paint-coated specimens.

*Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 127-131, 4 Fig., 3 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

15 314364

**THROUGH THEIR EYES, PART II: THE PEOPLE SPEAK**

The report provides a summary of American attitudes toward transportation and various transportation policies, and is based on a survey conducted in December 1977. The survey found Americans expected major changes in their life style and that transportation was supposed to be a major contributor to those changes. The report finds a strong distaste for mandatory solutions to transportation problems, particularly gas taxes or fuel rationing. The public would also seem to support additional investment in public transportation relative to highways, in highway maintenance, and in rail systems. The report contains backup tables, and excerpts from the survey instrument used to develop the data.

See also part 4, PB-298 952.

Paulhus, NG, Jr

Department of Transportation Final Rpt. DOT-I-78-2, Mar. 1978, 31p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-183346

15 318346

**ECONOMIC ADJUSTMENT STUDY: CHICAGO SOUTH SHORE AND SOUTH BEND RAILROAD CORRIDOR. FINAL REPORT**

Out of concern for the harm that could follow loss of the South Shore service, the United States Economic Development Administration has provided a grant of funds for an investigation. The purpose of these investigations has been to prepare an economic adjustment strategy setting forth steps that can be taken to preserve the South Shore services.

Also available in set of 3 reports PC E12, PB80-193493.

Northwestern Indiana Regional Planning Commission, Economic Development Administration EDA-80-075, Mar. 1980, 80p

Grant EDA-06-09-01493

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-193501

15 318347

**ECONOMIC ADJUSTMENT STUDY: CHICAGO SOUTH SHORE AND SOUTH BEND RAILROAD CORRIDOR. EXECUTIVE SUMMARY**

Various aspects of the South Shore corridor economic adjustment investigations are described. The investigations examine the economic adjustment problems that would attend demise of the South Shore as a carrier in northern Indiana, and identify steps that can be taken by public authorities to save the railroad. The objectives have been to identify service, marketing and investment requirements for effective restoration of financial health to the South Shore, and changes of organization structure that would assure the railroad's continuing future success.

Also available in set of 3 reports PC E12, PB80-193493.

Northwestern Indiana Regional Planning Commission, Economic Development Administration EDA-80-076, Mar. 1980, 12p

Grant EDA-06-09-01493

ACKNOWLEDGMENT: NTIS

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PB80-193519

15 318348

**ECONOMIC ADJUSTMENT STUDY: CHICAGO SOUTH SHORE AND SOUTH BEND RAILROAD CORRIDOR. APPENDICES**

The document presents an assessment of the marketing potentialities, an identification of requirements at each station site and the development of an overall investment strategy for stations along the South Shore line. This is a sketch planning technique. A separate description of problems and potentialities is presented for each station site along the line, including all of those that now exist and several that have been proposed for new station development.

Also available in set of 3 reports PC E12, PB80-193493.

Northwestern Indiana Regional Planning Commission, Economic Development Administration EDA-80-077, Mar. 1980, 278p

Grant EDA-06-09-01493

ACKNOWLEDGMENT: NTIS

106

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PB80-193527

15 318350

**USE OF MULTIPLE REGRESSION ANALYSIS TO SUMMARIZE AND INTERPRET LINEAR PROGRAMMING SHADOW PRICES IN AN ECONOMIC PLANNING MODEL**

A simple method is presented for evaluating the benefit to a region (regional objective function) of new manufacturing firms. These firms are subsets of the more aggregated 4-digit SIC manufacturing industries, some included and some not, in a rural multicounty economic planning model. The model must contain many types of industries to include the full range of industry; such addition is costly. Multiple regression analysis can summarize and interpret shadow prices of export industries so that local planners in their decision making can use the underlying economic characteristics of the model industries rather than use only their industry product classifications.

Williams, DG

Economics, Statistics, and Cooperatives Service TB-1622, May 1980, 43p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-194855

15 319312

**CONFLICTS BETWEEN URBAN AREAS AND RAILROADS: A STATUS REPORT**

The development of conflicts between urban areas and railroads in the United States is examined, and the nature and magnitude of the current problems and present and past effects to resolve them are described. Many American cities developed primarily as a result of the railroads, but changes in urban activities and transportation operations have altered somewhat the relation between the cities and railroads. Continuing expansion of urbanized areas and increases in vehicle travel have intensified the conflict. Cities have reacted by pushing for elimination of railroad-highway grade crossings and, in some cases, for consolidation, relocation, and/or removal of railroad tracks from the center city. Many city planners see the railroads as a hindrance to rejuvenation efforts. In some cities, underutilized railroad properties are in strategic locations that could be important in urban redevelopment plans. High-volume rail lines that pass through congested downtown areas can cause massive traffic jams and delays unless crossings are grade separated. Railroad-highway grade crossings pose safety problems to the motorist and restrict mobility, which is particularly important for emergency vehicles. In addition, the slow train speeds mandated by local municipalities, frequent grade crossings, and large numbers of trespassers are not compatible with efficient railroad operation. But new rail routes are difficult to locate and expensive to build, and there are many implementation problems involved in other, less expensive solutions, such as consolidation or abandonment.

This paper appeared in Transportation Research Record No. 744, Railroad Track and Facilities.

McGinnis, RG *Transportation Research Record* No. 744, 1980, pp 58-65, 2 Tab., 14 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

15 319686

**THE REAL STORY ON RAIL RELOCATION**

This booklet is intended to help local elected officials better understand urban rail conflicts from a railroad viewpoint and improve the chances for successfully accomplishing a relocation project. It is also intended to aid railroad executives become familiar with some of the tools and techniques that are available to resolve such dilemmas and also unlock the development potential of their property. Ten years of experience and research have produced realistic options capable of being implemented with a minimum of disruption. Several case studies are presented along with a general discussion.

United States Conference of Mayors May 1979, 20p, Photos.

ORDER FROM: United States Conference of Mayors, Railroad Land Revitalization Program, 1620 Eye Street, NW, Washington, D.C., 20006

DOTL RP



15 322034

**IMPACT OF RAIL TRANSIT ON LAND USE: EVIDENCE AND A CHANGE OF PERSPECTIVE**

The paper reviews the experience of the post-World War II period in rapid transit investment and its apparent effects on urban development. The intent of this review is to draw inferences concerning the potential strength of that relationship and to indicate why success in achieving such effects on land use seems to have varied so much between places such as Toronto, Ontario and San Francisco, California.

Knight, RL *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 3-16, 1 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

15 322519

**FUNCTIONS AND MANAGEMENT ON THE GERMAN FEDERAL RAILWAY [Auftrag und Fuehrung der Deutschen Bundesbahn]**

After a historical outline showing the importance of national railways, the author underlines the difficulties arising out of the conflict between the DB Management Board's business administration on the one hand and the socioeconomic role of the German Federal Railway on the other. The difficulties are due mainly to a lack of clarity in the definition of function on the DB. From the outside, the Board appears to have total responsibility and to run the enterprise as a profit making concern, though it is only supposed to hold to the principles of balancing the books, which applies to every railway. The Federal Government and the Board should take rapid steps to define tasks and responsibilities more clearly. [German]

Reemts, H

Nomos Verlagsgesellschaft mbH und Co KG Vol. 2 No. 4, 1979, 7p, 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Nomos Verlagsgesellschaft mbH und Co KG, Waldseestrasse 3-5, Postfach 610, D-7570 Baden-Baden, West Germany

15 322570

**THE SOCIAL CONSEQUENCES OF RAIL CLOSURES**

This study has drawn on three sources: personal interviews among people living in the areas from which rail services have been withdrawn, discussions with representatives of public and private organisations and the authorities acting on behalf of people living in the survey areas, and documentary evidence on rural rail closures, the 1971 census, bus timetables and other relevant information. The ten closed lines selected for the study are described together with the survey respondents' patterns of use of the rail lines before closure, and their patterns of activity and travel. The role of private transport and changes in it since closure are examined. The last part of the study is devoted to related social aspects of closure, including the general community response towards the processes and effects of closure. The main findings of the study are summarized and conclusions are drawn from them. The implications of this research for the policy options known to be under consideration in respect of the future planning of rural public transport services and the role of railways in this are outlined.

Hillman, M Whalley, A

Policy Studies Institute Monograph PSI Rpt. 587, 1980, 144p, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 248808)

ORDER FROM: Policy Studies Institute, 1-2 Castle Lane, London, England

15 322809

**TRANSPORT CHANGE AND SPATIAL DEVELOPMENT. GEOGRAPHICAL STUDIES OF THE EFFECTS OF CLOSING DOWN RAILWAYS-WITH EXAMPLES FROM TWO MUNICIPALITIES IN THE WEST OF SWEDEN**

[Transportföraändringar och rumslig utveckling. Geografiska studier av jaernvaegsnedlaeggningars effekter-med exempel fraan tvaa vaestsvenska kommuner]

The study attempts to exemplify tendencies towards concentration within the Swedish railway system. Attention is mainly focused on how these tendencies have affected the development in an area where a railway line has been closed down and replaced by buses and motor-cars. Two Swedish municipalities have been studied-Faegelanda and Vara. The study is not

limited to describing a sequence of events but also aims at evolving a methodology, by which various effects resulting from the closing-down of railways can be investigated. It also deals with how methods, hitherto adopted, can and should be improved. There are four main questions which the study attempts to answer. Firstly, the effects in a municipality/place connected with the closing-down of a railway. Secondly, the extent to which the abolishment of railway traffic creates opportunities for new transport activity, and, consequently, how the railway traffic was actually replaced by other transport solutions. Finally, the question of what circumstances should be taken into consideration, and what methods should be adopted in connection with the future shutting-down of railways, is discussed. [Swedish]

Holmgren, B

Gothenburg University, Sweden Monograph Serie B NR 65, 1980, 367p, 18 Fig., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 249218), National Swedish Road &amp; Traffic Research Institute

ORDER FROM: Gothenburg University, Sweden, Geografiska Institutionen, P.O. Box 3016, Gothenburg, Sweden

15 322827

**OPTIMIZING JOINT DEVELOPMENT AT TRANSIT STATIONS**

The Detroit Metropolitan Area was used as the experimental site for such feasibility testing. Two priority ranking methodologies were developed based upon provisions of rating and ranking methods. Station development potential was identified by a set of socio-economic and land use indicators, and the viewpoints of local professionals were solicited in assessing the relative importance of the indicators identified. Next, the relative rankings for 37 proposed transit stations on two travel corridors were developed using the indicators and the viewpoints of the local professionals. The study shows that it is possible to prioritize station locations for joint development based upon selected socio-economic and land use indicators. The results also suggest that the station ranks obtained by the two methods are not likely to be affected by input solicited from local professionals. Lastly, the procedures developed are found to be sensitive to selection of the indicators.

Arbogast, RG (Wayne State University); Khasnabis, S Opiela, KS *ASCE Journal of Transportation Engineering* Vol. 106 No. 5, Sept. 1980, pp 539-557, 13 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

15 322835

**LAND USE IMPACTS OF FIXED GUIDEWAY TRANSIT SYSTEMS: IMPLICATIONS FOR DOWNTOWN PEOPLE MOVER PROJECTS**

This paper describes the factors which have had an influence on the land use impacts of rapid rail systems in the past and the implications for the future Downtown People Mover projects. These factors include favorable local government policies, strong market conditions, and land availability.

Zumwalt, BA (Mitre Corporation) *Journal of Advanced Transportation* Spring Vol. 13 No. 1, 1979, pp 67-79, 7 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

15 322841

**AUTOMATED GUIDEWAY TRANSIT SOCIO-ECONOMIC RESEARCH PROGRAM: ISSUES AND EARLY FINDINGS**

The Automated Guideway Transit (AGT) Socio-Economic Research Program described is a comprehensive, multidisciplinary public transportation research program sponsored by the Urban Mass Transportation Administration (UMTA). It is designed to assess the performance and cost experiences of existing AGT systems, to evaluate the merits and liabilities of AGT systems as compared to conventional forms of public transportation, to determine the potential market for AGT technology in urban areas, and to assess the social acceptability of this transit technology. A discussion of the five major program activities and a summary of findings of complete research projects are included.

Evoy, HD (Urban Mass Transportation Administration); Zumwalt, BA *Journal of Advanced Transportation* Summer Vol. 13 No. 2, 1979, pp 65-84, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

15 323362

# **THE COST OF TRANSPORT IN QUEBEC [Le prix du transport au Quebec]**

This report represents an attempt at making readers more aware of the "economic dimension" of transport. It is based on the modern theory of public finance which limits the role of the government in a mixed capitalist economy, to three main functions: control of the economic activity, of the redistribution of incomes and riches, and of the allocation of resources. This study applies to the last category. An analysis is made of each road, rail, air and water transport mode which is assessed with a view to obtaining the optimum allocation of transport resources. [French]

Migue, JL Belanger, G Boucher, M  
Quebec Ministry of Transport, Canada Monograph 1978, 502p, 26 Fig., 101 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 105810), Central Laboratory of Bridges & Highways, France, Institute of Transport Research  
ORDER FROM: Quebec Ministry of Transport, Canada, 700 Boulevard Saint-Cyrille Est, Quebec City, Quebec G1R 4K9, Canada

15 324878

# **APPLICABILITY OF JOINT DEVELOPMENT TOOLS IN DETROIT**

Joint development (JD) is a process by which major public facilities are constructed in concert with other projects through the coordinated efforts of public or private agencies, or both. This paper focuses upon the identification and analysis of JD mechanisms for use in the Detroit area where major transit investments are anticipated. A total of nine basic types of JD mechanisms were identified and evaluated in the context of the institutional structure of the area. The mechanisms were evaluated for feasibility by considering statutory basis, taxation issues, revenue sources, bonding authority, public approval, jurisdiction, organizational basis, and other relevant aspects. The evaluation indicated that many JD mechanisms could be considered feasible for use in the Detroit area. In some cases, precedents existed for the use of particular tools. In addition, several local agencies were found to have the authority and capabilities to administer JD programs.

Opiela, KS (General Motors Corporation); Khasnabis, S Arbogast, RG *ASCE Journal of the Urban Plan and Develop Div* Vol. 106 No. 1, Nov. 1980, pp 71-88, 16 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

15 325462

# **BENEFIT-COST ANALYSIS IN RAIL BRANCH-LINE EVALUATION**

Section 5 of the Department of Transportation Act of 1966, as amended by the Local Rail Service Assistance Act of 1978, requires that a "methodology for determining the ratio of benefits to costs of projects" be included in state rail plans. This paper discusses some of the key issues that should be addressed in these methodologies. First, common errors are identified that occur in branchline benefit-cost analyses that are submitted to the Office of State Assistance Programs of the Federal Railroad Administration. Techniques for avoiding these errors are suggested. A basic analytical framework for the evaluation of branch-line projects is presented that is then extended to cases in which projects are expected to (a) affect related transportation services and (b) produce improvements in the quality of branch-line service. Problems that arise from the relocation of capital and labor are also discussed.

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck, and Intermodal.

Smith, M Butler, SE Harvey, TN *Transportation Research Record* No. 758, 1980, pp 29-34, 3 Fig., 1 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

15 325872

# **RESPONSE OF URBAN REAL ESTATE VALUES IN ANTICIPATION OF THE WASHINGTON METRO**

The effect of public mass transit systems on the spatial distribution of urban property values is likely to be highly parcel-specific. Changes in real estate values may occur both before and after construction of a transit system. This article describes a series of econometric models of real estate values estimated for parcels in Washington, DC, over the period of the planning and initial construction of the metro system. Separate models are estimated for single-family dwellings, multi-family structures and retail stores. Access to Metro and its implementation schedule are both found to be significant determinants of parcel transaction prices.(a)

Damm, D (Department of Transportation); Lerman, SR (Massachusetts Institute of Technology); Lerner-lam, E (Orange County Transit District); Young, J (Commonwealth Of Massachusetts) *Journal of Transport Economics* Vol. 14 No. 3, Sept. 1980, pp 315-336, 6 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 250273)

ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

DOTL JC

16 312377

**FUEL CONSERVING LUBRICANTS FOR DIESEL ENGINES**

The literature reports that diesel engines respond to lubricants optimized in viscometrics and composition to reduce metal-to-metal friction and fuel consumption. Conservation of the world's hydrocarbons requires that lubricants be so optimized. This study shows that mineral-based lubricants for high-and medium-speed diesel engines can be formulated to improve fuel economy by incorporating suitable additives.

Paper presented at the ASME Energy Technology Conference and Exhibit, 3-7 February 1980.

Younghouse, E (Exxon Research and Engineering Company) *American Society of Mechanical Engineers Papers* Conf Paper 80-DGP-9, 1980, 13p, 15 Ref.

ORDER FROM: ESL

16 312447

**RE-REFINED LOCOMOTIVE ENGINE OILS AND RESOURCE CONSERVATION**

Nearly all railroads in North America have been recycling locomotive diesel engine oil during the past three decades. During this time, rerefining has developed from simple filtration to acid/clay treatment and, more recently, to vacuum distillation. Volumes of additives and contaminants contained in the engine drain oil have increased significantly during the past ten years. These changes have occurred with the increase in specific power output by engine builders and the increase in engine oil drain intervals by the railroads. Rerefiners have made large capital investments in plant equipment to accommodate both new additive technology and antipollution constraints. The production of rerefined base stocks which meet the performance requirements of the engine users will continue to grow as a result of mounting concern for environmental protection and resource conservation.

Blatz, FJ Pedall, RF *Lubrication Engineering* Vol. 35 No. 11, Nov. 1979, pp 618-624, 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

16 314174

**FRESNEL/PHOTOVOLTAIC CONCENTRATOR APPLICATION EXPERIMENT FOR THE DALLAS-FORT WORTH AIRPORT. PHASE 1: SYSTEM DESIGN, FINAL TECHNICAL REPORT, 1 JUNE 1978-28 FEBRUARY 1979**

This Phase I Final Report summarizes the analytical, experimental, design, and specification efforts for the first nine months of the Dallas/Fort Worth Airport Fresnel/Photovoltaic Concentrator Application Experiment. The overall objective of the complete three-phase program is to develop and demonstrate a unique photovoltaic concentrator total energy system which, when mass-produced, will provide electrical and thermal energy at costs competitive with conventional energy sources. Toward this objective, the Phase I-System Design contract has been completed, resulting in a final system design, analytical definition of system performance and economics, and a successfully tested prototype collector which fully verified performance predictions. The proposed system will utilize 245 m exp 2 of E-Systems linear Fresnel photovoltaic collectors to provide 25 kW/sub e/ (AC) of power and 140 kW/sub t/ of heat to the Central Utility Facility of Dallas/Fort Worth Airport. The electric power will be used to meet a continuous lighting load, while the thermal energy will be used to preheat boiler feedwater. Peak system efficiencies will be 10.2% electric (insolation to net AC output) and 56% thermal (insolation to net heat delivered). Annual efficiencies will be 8.4% electric and 49% thermal. Production system economics are attractive in the near term: 7 cents/kWh electricity and \$7/MMBtu heat (1975 \$) could be achieved by 1981 with limited production. With higher production, these costs could be halved by 1990. (ERA citation 05:015309)

O'Neill, MJ

E-Systems, Incorporated, Department of Energy Mar. 1979, 104p

Contract ET-78-C-04-5311

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

DOE/CS/95311-1

16 315312

**THE RAILROADS AND THE ENERGY CRISIS**

Railroads, along with their inherent energy efficiency as compared with other freight transport modes, actively strive to reduce fuel consumption even further through changes in operations, fueling practices, and car designs which can reduce weight and aerodynamic drag. While railroads have received some relief from rising fuel costs through regulatory clearance of more rapid rate increases, they were not included in priority status for fuel allocation during shortage periods. Coal hauling has not expanded as rapidly as expected, even though railroads have the inherent capacity for such traffic growth.

Murray, JE (Association of American Railroads) *Transportation Research Circular* No. 216, Apr. 1980, pp 4-6, 6 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

16 315426

**ALTERNATE FUELS FOR MEDIUM-SPEED DIESEL ENGINES**

Tests were performed on a two-stroke cycle medium-speed diesel engine in an attempt to define the ability of this class of engines to operate on certain alternate fuels, and to define the performance characteristics of the engine under such operation. Off-specification diesel fuels were defined as those fuels with one or more properties which did not lie in the currently accepted range of specifications for Number 2 diesel fuel. Cetane number, viscosity, and distillation range were systematically varied as independently of other properties as was possible by blending various fuel components. Limiting fuel properties were defined and, where possible, the influences of fuel properties on performance and emission were determined.

Baker, QA (Southwest Research Institute) *Society of Automotive Engineers Preprints* SAE 800330, Feb. 1980, 13p, 1 Ref.

ORDER FROM: ESL

16 317687

**PROJECTIONS OF DIRECT ENERGY CONSUMPTION BY MODE: 1975-2000 BASELINE**

This report presents a comprehensive set of activity and energy-demand projections for each of the major transportation modes and submodes. Projections are developed for a business-as-usual case which provides a benchmark for assessing the impact of potential conservation strategies. This baseline case assumes a continuation of present trends and no new energy-conserving programs beyond currently mandated fuel economy standards. However, because of anticipated changes in personal vehicle fuel economy, fuel prices, modal shifts, and a lower than historic rate of economic growth, projected growth rates in transportation activity and energy consumption depart from historic patterns. The text discusses the factors responsible for this departure, documents the assumptions and methodologies used to develop the modal projections, and compares the projections with other efforts. (ERA citation 05:001201)

Knorr, RE Millar, M

Argonne National Laboratories Aug. 1979, 139p

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS

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ANL/CNSV-4

16 317757

**TEC MODEL: TRANSPORTATION ENERGY CONSERVATION MODEL. FINAL REPORT**

About one-third of all the energy consumed in the United States is burned by transportation vehicles, using 60% of all the petroleum that is consumed. The diversity and complexity of the total stock of transportation vehicles requires that meaningful analyses of conservation options must be based on sophisticated analytical capabilities. This report describes a computer-simulation model of transportation vehicles that provides such an analytical capability. Energy can be saved in transportation in several ways. Each trip that is taken could be made more efficient, which would generally lower the total number of trips taken. Trips that are of marginal usefulness can simply be eliminated. Finally, the fuel-consumption characteristics of the vehicles themselves can be altered to make them more efficient. The Transportation Energy Conservation Model provides a capability for analyzing the effects

of altering the fuel efficiencies of the various transport vehicles, and allows some capability for analyzing the effects of changes in the level of use.

Faucett (Jack) Associates, Department of Energy Aug. 1978, 167p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

JACKFAU-78-159-2

#### 16 318278

### DEVELOPMENTAL RESEARCH PROGRAM FOR CLEAN INDUSTRIAL AND TRANSPORTATION FUELS FROM COAL. FINAL REPORT, SEPTEMBER 1976-MARCH 1979

An integrated coal liquefaction process development unit was operated to demonstrate The Lummus Clean Fuels From Coal (CFFC) Process. The objectives were as follows: Establishment of integrated operation, demonstration of solvent self-sufficiency on equilibrium solvent, life testing of catalyst, process variable studies, and comparative catalyst performance against a reference coal liquefaction catalyst. The extent of attainment of the objectives may be summarized as follows: Integrated operation was achieved, solvent self-sufficiency was demonstrated, catalyst life test data were obtained, process variable studies were completed, and comparative catalyst activity data were obtained. The major reactor feature of the CFFC process is an approach to plug flow of the coal paste through a series of expanded-bed reactors. This flow regime provides the best kinetics for heteroatom removal, emphasizes distillate (400 to 850 exp 0 F) production and thereby minimizes hydrogen consumption at nearly complete coal conversion. This was amply demonstrated during the process variable study, where the maximum chemical hydrogen consumption was 3.7 weight percent for the most reaction conditions. For the less severe conditions appropriate for this process, chemical hydrogen consumption was approximately 3 wt%. The catalyst life study showed that a 400 exp 0 F boiler fuel product containing 0.3% sulfur, 0.5% nitrogen and 0.1% ash is made with a catalyst consumption of 1.21 pounds per ton of coal. The hydrogen consumption of about 3 percent required to make this clean liquid product is lower than for any other one or two-stage coal liquefaction process. A part of the process variable study, high-viscosity runs, utilizing minimum recycle, established the upper through-put limit in the first reactor to be 3.6 to 3.9 lb coal/hr/lb catalyst, depending on the catalyst shape. (ERA citation 05:019968)

Schindler, HD Long, RH  
Lummus Company, Department of Energy Dec. 1979, 171p

Contract EF-76-C-01-2514

ACKNOWLEDGMENT: NTIS  
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FE-2514-31

#### 16 318338

### STATE ENERGY DATA PUBLIC USE FILE

This file contains annual energy consumption data in both physical units and British thermal units by major end-use sectors (residential, commercial, industrial, transportation, and electric utilities), by State (50 States and the District of Columbia) and the United States, and by major fuel types (coal, petroleum, natural gas, and electricity) for 1960 through 1978.

Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-191224.

Seiferlein, KE  
Department of Energy DOE/DF-80/001, 1978, n.p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-191216

#### 16 318357

### REPORT OF THE GOVERNOR'S TASK FORCE COMMITTEE ON HYDROGEN ENERGY

The report describes different aspects of the large scale use of hydrogen as an energy carrier, and their importance to New Mexico. The contents are as follows: Supporting research with respect to the hydrogen economy; Production; Transport; Storage; Utilization; Environment; Safety; System integration.

New Mexico Governor's Energy Task Force June 1975, 48p

ACKNOWLEDGMENT: NTIS  
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PB80-204282

#### 16 318624

### PERFORMANCE OF A DIESEL ENGINE OPERATING ON RAW COAL-DIESEL FUEL AND SOLVENT REFINED COAL-DIESEL FUEL SLURRIES. FINAL REPORT

Performance tests using an 11 kW single cylinder diesel engine were made to determine the effects of three different micronized coal-fuel oil slurries being considered as alternative fuels. Slurries containing 20, 32, and 40%-wt micronized raw coal in No. 2 fuel oil were used. Results are presented indicating the changes in the concentrations of SO/sub X/ and NO/sub X/ in the exhaust, exhaust opacity, power and efficiency, and in wear rates relative to operation on fuel oil No. 2. The engine was operated for 10 h at full load and 1400 rpm on all fuels except the 40%-wt slurry. This test was discontinued because of extremely poor performance. (ERA citation 05:024335)

Marshall, HP  
Virginia Polytechnic Institute & State University, Department of Energy  
Mar. 1980, 129p

Contract ET-78-S-01-3288

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

CONS-3288-T6

#### 16 319703

### ALTERNATE ENERGY SOURCES FOR NON-HIGHWAY TRANSPORTATION

The overall objectives for the study were to examine the choices for alternate fuels in each mode-aircraft, marine, railroad, and pipeline for the present (now-1985), mid-term (1985-2000), and long-term (2000), and to recommend R & D ideas for each mode. The paper summarizes a preliminary screening step where many different types of prime movers and fuels were evaluated, an evaluation for each mode.

From 16 Highway Vehicle Systems Contractors Coordination Meeting, Dearborn, MI, April 24, 1979.

Cart, EN, Jr  
Department of Energy Sept. 1979, pp 443-448

ACKNOWLEDGMENT: Department of Energy  
ORDER FROM: Department of Energy, 1000 Independence Avenue, SW, Washington, D.C., 20585

#### 16 319999

### WORLDWIDE TRANSPORTATION/ENERGY DEMAND, 1975-2000. REVISED VARIFLEX MODEL PROJECTIONS

The salient features of the transportation-energy relationships that characterize the world of 1975 are reviewed, and worldwide (34 countries) long-range transportation demand by mode to the year 2000 is reviewed. A worldwide model is used to estimate future energy demand for transportation. Projections made by the forecasting model indicate that in the year 2000, every region will be more dependent on petroleum for the transportation sector than it was in 1975. This report is intended to highlight certain trends and to suggest areas for further investigation. Forecast methodology and model output are described in detail in the appendices.

The report is one of a series addressing transportation energy consumption; it supplants and replaces an earlier version published in October 1978 (ORNL/Sub-78/13536/1).

Ayres, RU Ayres, LW  
Variflex Corporation Mar. 1980, 176p, Tabs., 8 Ref., 3 App.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

ORNL/Sub-79/45740/1

#### 16 320262

### DOT 10; DIESEL FUEL FORECAST FOR CLASS I RAILROADS

Fuel consumption data is presently reported on an annual basis by individual companies. Quarterly forecasts for diesel fuel needs for Class I Railroads are based upon current consumption trends.

Federal Railroad Administration Annual No Date, n.p.



ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (262)  
ORDER FROM: FRA

16 322002

**UNCERTAIN TRANSPORTATION ENERGY FUTURES--U.S. COMPARED WITH OTHER REGIONS OF THE WORLD, 1970-2000**

The U.S. uses more transportation energy in total and per capita than any other region of the world. Over two-thirds of this energy is used to move passengers whereas most other regions use only about a fourth of their transportation energy to transport people. The U.S. is comparatively energy efficient in regard to movement of freight and this relative efficiency is expected to improve by the year 2000. Transportation has had greater importance in the overall energy picture than might be assumed on the basis of its share of total energy use. As will be seen, transportation appears to offer significant opportunities for increased efficiency of energy use.

Changing Energy Use Futures, International Conference on Energy Use Management, 2nd, Los Angeles, California, October 22-26, 1979. Volume 1.

Ayres, RU Ayres, LW (Variflex Corporation)  
Pergamon Press, Incorporated Conf Paper 1979, pp 59-66, 8 Ref.

ACKNOWLEDGMENT: EI

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

16 322003

**SOME PROBLEMS OF DEFINITION RAISED BY A TRANSPORTATION ENERGY DATA BASE**

Oak Ridge National Laboratory has addressed the definitional problems in its development of a transportation energy data base for the Department of Energy. One is the fundamental problem of analyzing the notion of energy consumption itself. The second definitional problem is that of distinguishing between energy used for transportation from that used for other purposes. The distinction can be reasonably drawn in a number of ways, and the paper explores the implications and usefulness of a few of these ways.

Changing Energy Use Futures, International Conference on Energy Use Management, 2nd, Los Angeles, California, October 22-26, 1979. Volume 1.

Hooker, JN (Oak Ridge National Laboratory)  
Pergamon Press, Incorporated Conf Paper 1979, pp 286-293, 7 Ref.

ACKNOWLEDGMENT: EI

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

16 322032

**ENERGY AND THE TRANSPORT SECTOR**

This article describes the current energy situation from both the global viewpoint and the viewpoint of countries with no indigenous sources of fossil fuels. In Sweden, for example, the main energy reserves of the future are hydro power and uranium. Electricity therefore becomes a natural means of distribution of energy. The lack of fossil fuels necessitates a substitution with indigenous sources of energy, where feasible. Long-distance railway transport is a self-evident element in the expanding transport sector. In view of the proven high energy efficiency of electric railway systems, there is every incentive for a more active investment policy in railway electrification. This applies to both medium-distance transportation of freight and passengers and different electric mass transit systems.

Olson, PE *ASEA Journal* Vol. 52 No. 6, 1979, pp 137-142

ACKNOWLEDGMENT: EI

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16 322537

**THE SEARCH FOR ALTERNATIVE DIESEL FUELS**

Southwest Research Institute has been working since August 1978 on a research program funded by Department of Energy, FRA and AAR to investigate use of alternative fuels for medium-speed diesel engines. In the face of increasing cost and possible supply problems for specification fuels, the program seeks to (1) identify problems associated with operation on a broad range of fuels and to develop solutions to these problems; (2) identify problems of conversion of existing engines to use of alternative fuels; and (3) disseminate the information so that all concerned might take advantage of it. Among options being studied are off-specification fuels, hybrid fuels, broad-cut fuels, alcohols, petroleum gases, and dual-fuel operation.

Welty, G *Railway Age* Vol. 181 No. 17, Sept. 1980, p 53, 4 Phot.  
ORDER FROM: ESL

DOTL JC

16 322553

**DEUTSCHE BUNDESBahn: A TRANSPORT OPERATOR ECONOMIZES ON ENERGY**

Power generation in the German Federal Republic is mainly dependent on fossil sources of energy which are non-regenerative. In view of the limited availability of these energy sources, immediate action must be taken to accomplish a better utilization of energy and to make substitutes available as far as practicable. This applies especially to mineral oil which still accounts for more than 50% of the primary energy used in the German Federal Republic. Road transport, inland waterway transport and air transport are almost entirely dependent on this source of energy. In contrast to this, Deutsche Bundesbahn's energy structure is well balanced due to continuous extrapolations in planning over a period of three decades. Even today, around 83% of DB's transport services are already rendered by means of electric traction, with the necessary energy being obtained almost entirely from national sources of primary energy which are unaffected by a crisis. In conjunction with the economy practised in the use of energy, this security of supply is a convincing argument in favour of extending the transport capacity by building new lines and of maintaining a transport undertaking which is unaffected by the energy crisis. [German]

Harprecht, W *Glaser's Annalen ZEV* Vol. 104 No. 7, July 1980, pp 181-188

ACKNOWLEDGMENT: British Railways

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DOTL JC

16 322573

**URBAN ACTIVITY ALLOCATION UNDER CRITERIA OF TRANSPORTATION ENERGY EFFICIENCY**

A linear programming optimization technique is applied to the problem of allocating new land using activities in an existing urban area. While it is recognized that energy is not yet as decisive a factor in the determination of household and firm locational patterns as other factors such as accessibility and time costs, the model attempts to resolve land allocation problems by means of minimizing total transportation energy costs alone. Such an analysis may serve as a benchmark against which other policies and their energy repercussions could and should be measured.

Romanos, MC (Illinois University, Urbana); Hatmaker, ML *International Journal of Energy Research* Vol. 4 No. 1, Jan. 1980, pp 1-10, 24 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

16 322817

**HYDROGEN FUEL APPLICATIONS FOR URBAN TRANSIT**

With the growing scarcity of fossil fuels and continuing concern about air quality, an increased need for viable urban transit solutions has become apparent. Hydrogen, a synthetic fuel which may be used to power internal combustion engines, provides an exceptional alternative to gasoline or diesel fuel in urban transit applications. A bus or light rail system utilizing hydrogen would be independent of oil supplies and virtually non-polluting. NASA and the aerospace industry have contributed significantly to an increased understanding of the fuel properties of hydrogen, and its increased range of applications. Technology now exists for conversion of city buses, trucks, and rail systems to hydrogen fuel. This study considers the technical aspects of hydrogen vehicle systems, summarizes past and present working examples, and describes a proposed integrated refuse disposal-hydrogen fueled transit system for the City of Denver, Colorado.

Proceedings of the Soc and Aerospace Technology Workshop, Los Angeles, California, November 15, 1979.

MacCarley, CA (Denver University) *AIAA Monographs* Vol. 25 1979, pp 45-62, 24 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Western Periodicals Company, 13000 Raymer Street, North Hollywood, California, 91605

16 322829

**DIRECT INJECTED METHANOL FUELING OF TWO-STROKE LOCOMOTIVE ENGINE**

One cylinder of a two-stroke cycle locomotive engine was converted to operate with methyl alcohol (methanol) as primary fuel and pilot injection

of diesel fuel for ignition. Two fueling schemes, featuring injection of methanol and pilot fuel at different locations in the cylinder, were evaluated. For Meeting held February 25-29, 1980.

Wood, CD (Southwest Research Institute); Storment, JO *Society of Automotive Engineers Preprints* SAE 800328, 1980, 8p

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

16 322830

#### PERFORMANCE OF COAL SLURRY FUEL IN A DIESEL ENGINE

Three slurry fuels containing different concentrations of coal were tested in a small-bore 4-cylinder diesel engine equipped with modified injectors under various loads and speeds. Exhaust temperatures, smoke, blowby, and brake thermal efficiencies were determined under these conditions. The relative effectiveness of coal in saving diesel fuel was determined.

For Meeting held February 25-29, 1980.

Tataiah, K (Southwest Research Institute); Wood, CD *Society of Automotive Engineers Preprints* SAE 800329, 1980, 12p

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

16 322832

#### COMPARATIVE PERFORMANCE AND EMISSION CHARACTERISTICS OF PETROLEUM, OIL SHALE AND TAR SANDS DERIVED DIESEL FUELS

The performance and emission characteristics of diesel fuels derived from oil shale and tar sands were compared with those of regular petroleum based #2 diesel fuel. The comparison based on diesel engine tests, shows only slight differences in performance and emissions. These differences can be related to physico-chemical properties. The effect of fuel bound nitrogen, which might be present in shale derived fuel, on NO<sub>x</sub> emission was also studied.

For Meeting held February 25-29, 1980.

Tuteja, AD (Detroit Diesel Allison); Clark, DW *Society of Automotive Engineers Preprints* SAE 800331, 1980, 9p, 16 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

16 322934

#### LONG-DISTANCE TRAFFIC IN THE FEDERAL REPUBLIC OF GERMANY IN THE CONTEXT OF ENERGY SHORTAGE [Fernverkehr in der Bundesrepublik Deutschland unter Bedingungen einer Energieverknappung]

Different energy scenarios and investment strategies are examined in a railway context and with particular reference to their repercussions on the network. The effects of energy shortages and higher prices on long-distance passenger and freight transport in the Federal Republic of Germany are also studied. The main conclusion is that the effects on the volume of railway traffic will be only very slight. [German]

Hautzinger, H *Internationales Verkehrswesen* Vol. 32 No. 3, 1980, pp 153-157

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

16 322940

#### IMPORTANT AND URGENT PROBLEMS. METHODS OF SAVING ENERGY IN TRAIN TRACTION [Zadaca vaznaja, problema ostraja. O putjah ekonomii energoresursov na tjagu poezdov]

In 1979, rail transport in the USSR consumed some 58000 million kW/h of electric current, mostly (85%) for hauling trains. It has been decided to save 340 million kW/h of electricity and 72000 tons of heavy oil in 1980. The author stresses that the most significant energy savings in train traction can be made through better technical maintenance of rolling stock, rational organization of train running, diagrams, perfecting the train operating techniques of driving crews and introduction of regenerative braking. [Russian]

Bzickij, VN *Elektricheskaya i Teplovoznaja Tiaga* Vol. 6 No. 282, June 1980, pp 4-6

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

16 322943

#### END USE ENERGY CONSUMPTION DATA BASE: TRANSPORTATION SECTOR

The transportation fuel and energy use estimates developed at Oak Ridge National Laboratory (ORNL) for the End Use Energy Consumption Data Base are documented. The total data base contains estimates of energy use in the United States broken down into many categories within all sectors of the economy: agriculture, mining, construction, manufacturing, commerce, the household, electric utilities, and transportation. The transportation data provided by ORNL generally cover each of the 10 years from 1967 through 1976 (occasionally 1977 and 1978), with omissions in some models. The estimates are broken down by mode of transport, fuel, region and State, sector of the economy providing transportation, and by the use to which it is put, and, in the case of automobile and bus travel, by the income of the traveler. Fuel types include natural gas, motor and aviation gasoline, residual and diesel oil, liquefied propane, liquefied butane, and naphth- and kerosene-type jet engine fuels. Electricity use is also estimated. The mode, fuel, sector, and use categories themselves subsume one, two, or three levels of subcategories, resulting in a very detailed categorization and definitive accounting.

Hooker, JN Rose, AB Greene, DL  
Oak Ridge National Laboratory Feb. 1980, 426p

Contract W-7405-ENG-26

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

DOE/EIA/CR-7405-01

16 322945

#### TRANSPORTATION ENERGY DEMAND IN ALTERNATIVE FUTURES

Four alternative-futures scenarios (high and moderate growth, changing values, depression, and recovery) were developed, including key assumptions about economic, demographic, and social conditions, about resource availability. These scenarios are used to provide a context for projecting transportation energy demand, and to provide framework for other kinds of long-range studies of transportation energy use and related factors. Energy-demand projections, from the present through the year 2025, were made for each major mode of transportation-automobiles and personal trucks, buses, railroads, commercial trucks, aviation, and water transportation. A set of long-range scenarios and baseline projections of transportation energy demand consistent with each scenario was provided. These baselines are intended to serve as starting points for future analyses of various transportation energy-conservation strategies. A common alternative-futures scenario framework for future work is provided. The scenarios developed can be elaborated for closer study of different projections of regional-transportation energy use; they can serve as the bases for inputs to more-elaborate forecasting models; or they can serve as starting points for developing other scenarios of the future.

SRI International July 1978, 87p

Contract AT03-76CS0115

ACKNOWLEDGMENT: Energy Research Abstracts  
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DOE/CS/00115-T1

16 322958

#### FUEL CONSERVATION OPPORTUNITIES THROUGH CHANGES IN MODE OF FREIGHT TRANSPORTATION. FINAL REPORT

The study identifies opportunities for and barriers to increased use of railroads to promote fuel conservation. Transportation officials were interviewed from 9 companies in the processed food, metals, chemicals, and transportation vehicle industries. These industry personnel identified unreliable delivery times and equipment shortages as the key issues in their decision not to use the railroads. A range of actions that railroad management could take to improve transit time reliability is identified. Barriers to implementing changes include (in increasing order of difficulty) changes in operating practices, capital outlays, increased operating costs, and changes in work rules. Ranked by increased order of difficulty to



implement actions to improve reliability are as follows: rationalize train schedules, yard crew assignments in terminal areas, system blocking plan, and configuration of complex terminal areas; schedule freight cars from door to door; and operate freight trains more frequently.

Corbett, RM Moon, AE  
SRI International June 1979, 53p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

SAN-1176-T5

16 322962

**ENERGY STUDY OF RAIL PASSENGER TRANSPORTATION.  
VOLUME 4. EFFICIENCY IMPROVEMENTS AND INDUSTRY  
FUTURE. FINAL REPORT**

Measures that offer promise of efficiency improvements or economy in energy usage in rail passenger transportation are identified and described; the future of rail passenger transportation in the US is discussed; and possible future roles of Federal agencies are discussed.

Henderson, C Wilhelm, JP  
SRI International Aug. 1979, 63p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

SAN-1176-T2(Vol. 4)

16 322963

**ENERGY STUDY OF RAIL PASSENGER TRANSPORTATION.  
VOLUME 1. EXECUTIVE SUMMARY**

The results and conclusions of the study of SRI treats the following topics: physical assets and services of rail passenger systems; energy demands and intensities; roles of local institutions; the industry future; and the role of the Federal government. Data reported were collected in 1976 and 1977, and in most cases, cover calendar year 1975.

Henderson, C  
SRI International Aug. 1979, 43p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

SAN-1176-T2(Vol. 1)

16 322964

**ENERGY STUDY OF RAIL PASSENGER TRANSPORTATION.  
VOLUME 2. DESCRIPTION OF OPERATING SYSTEMS. FINAL  
REPORT**

The rail passenger systems of the US are described in terms of selected physical, operating, and economic characteristics, and services rendered are related to energy usage and costs. Rail passenger transportation exists in 4 distinct forms: intercity railroads, suburban railroads, heavy-rail transit, and light-rail transit. Each form varies in technical equipment, design of facilities, operating practices, size of systems. Specific data for the national rail passenger network and the Boston, Chicago, Cleveland, New York, Philadelphia, Pittsburgh, and San Francisco regions and the Washington Metropolitan area transit authority are presented.

Henderson, C Ellis, HT Wilhelm, JP  
SRI International Aug. 1979, 171p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
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SAN-1176-T2(Vol. 2)

16 322965

**ENERGY STUDIES OF RAIL PASSENGER TRANSPORTATION.  
VOLUME 3. INSTITUTIONS**

The institutional structures of most rail passenger systems have undergone major changes during the past decade because of the decline in private ownership and control and the increase in responsibilities of numerous public agencies—both long established and newly created. These shifts in ownership and control are described and some of the institution-related problems that Federal agencies may encounter in planning and executing

future programs for energy conservation in rail passenger transportation are discussed. The principal private companies and public agencies participating in rail passenger transportation are briefly discussed.

Henderson, C  
SRI International Aug. 1979, 28p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
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SAN-1176-T2(Vol. 3)

16 322966

**ENERGY STUDY OF RAILROAD FREIGHT TRANSPORTATION.  
VOLUME 1. EXECUTIVE SUMMARY**

The railroad industry plays a vital role in transporting goods, raw materials, and food necessary to the well being of the population and necessary to facilitate the operations of our industrial economy. Because of the vital part that the railroad industry plays in the economy and because of its ability to move goods with relatively small amounts of fuel, the US ERDA embarked on a study to determine the role of the Federal government in promoting conservation in the industry and in freight movements in general. Toward this final objective, the study compiled a description of the railroad industry, its structure, equipment, facilities, economics, and energy consumption; compiled a description of the regulation of the industry and considered ways in which the regulation has affected fuel consumption by the railroads; and analyzed candidates for fuel efficiency improvement and evaluated them on the basis of economics and the likelihood of their adoption by industry. A description of the industry, an analysis of energy consumption by the industry, a discussion of mechanisms for evaluating efficiency improvement proposals, a description and evaluation of conservation efficiency improvement proposals, a description and evaluation of conservation opportunities, and a discussion of recommended activities are included.

SRI International Aug. 1979, 36p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
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SAN-1176-T1(Vol. 1)

16 322967

**ENERGY STUDY OF RAILROAD FREIGHT TRANSPORTATION.  
VOLUME 2. INDUSTRY DESCRIPTION**

The United States railroad industry plays a key role in transporting materials to support our industrial economy. One of the oldest industries in the US, the railroads have developed over 150 years into their present physical and operational configuration. Energy conservation proposals to change industry facilities, equipment, or operating practices must be evaluated in terms of their cost impact. A current, comprehensive and accurate data baseline of railroad economic activity and energy consumption is presented. Descriptions of the history of railroad construction in the US and current equipment, facilities, and operation practices follow. Economic models that relate cost and energy of railroad service to the volume of railroad output and to physical and operational parameters are provided. The analyses and descriptions should provide not only an analytical baseline for evaluating the impact of proposed conservation measures, but they should also provide a measure of understanding of the system and its operations to analysts and policy makers who are involved in proposing, analyzing, and implementing such changes.

SRI International Apr. 1979, 146p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

SAN-1176-T1(Vol. 2)

16 322968

**ENERGY STUDY OF RAILROAD FREIGHT TRANSPORTATION.  
VOLUME 3. REGULATION AND TARIFF**

Volume 1 described the history of the railroad industry and pointed out that the number of separate companies, their monopoly power, and their trade and labor practices invited regulation by outsiders from the early days. Even though new regulations have been added over the years, few have been removed. Tariffs have been modified to fit a number of needs, not all of them economic. The effects of government regulation on the energy efficiency of



railroad operations are examined. The development of railroad regulation is examined and the governmental legislation, policies, and procedures that make up the regulatory environment within which the railroads must operate are briefly described. The relationship among regulations, energy usage, and costs in three specific areas of regulation; long-haul rates, empty car distribution, and rates on low-density rail traffic are examined.

SRI International Aug. 1979, 104p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts

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SAN-1176-T1(Vol. 3)

16 322969

**ENERGY STUDY OF RAILROAD FREIGHT TRANSPORTATION. VOLUME 4. EFFICIENCY IMPROVEMENTS AND INDUSTRY FUTURE**

Railroad equipment and operating practices were largely developed in an era during which the price of fuel was a relatively minor part of the cost of railroad operations; however, fuel has now become a scarce and expensive resource. Although many opportunities exist for installing new equipment and operating practices that will result in fuel conservation, cost and market factors can promote or retard the rate at which changes are adopted, and only limited technology may be available for use in conservation applications. Conservation opportunities are identified and potential technological and operational improvements are described that can be introduced; the process of introducing new technology in the railroad industry is analyzed; the future of the railroad industry is assessed; and research and development that will contribute to the adoption of energy conservation equipment or processes in the industry are identified.

SRI International Aug. 1979, 154p

Contract EY-76-C-03-1176

ACKNOWLEDGMENT: Energy Research Abstracts

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SAN-1176-T1(Vol. 4)

16 322981

**USING COKING DISTILLATE FRACTIONS AS FUEL FOR LOCOMOTIVE GAS TURBINE ENGINES [Ispol'zovanie fraktsii distillyatov koksovaniya v kachestve topliva dlya lokomotivnykh gazoturbinnnykh dvigatelei]**

Results of an investigation of the possibility of augmenting gas turbine fuel resources by using liquid products of coking of heavy resin of stabilization of a heavy broad aromatic fraction and heavy resin of benzene pyrolysis are presented. The possibility of utilizing a fraction boiling off prior to 350 deg C as a gas turbine fuel component is shown. [Russian]

Aver'yanova, ZP Shikhaliyade, PD Salimova, NA Alieva, SG *Izvestiya Vysshikh Uchebnykh Zavedenii Neft i Gaz* No. 11, 1979, p 46

ACKNOWLEDGMENT: EI

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16 323243

**EFFECT OF A SUDDEN FUEL SHORTAGE ON FREIGHT TRANSPORT IN THE UNITED STATES: AN OVERVIEW**

A survey was made of the potential effects of a sudden reduction of fuel supplies on freight transport via truck, rail, water and pipeline. After a brief discussion of the energy characteristics of each of these modes of transport, short-term strategies for making better use of fuel in a crisis are investigated. Short-term is taken to mean something on the order of six months, and a crisis is taken to be the result of something on the order of a 20% drop in available fuel. Although no succinct or well-established conclusions are drawn, the gist of the paper is that the potential for short-term conservation, without a serious disruption of service, exists but does not appear to be large. It is remarked that it is possible, through further study, to obtain a fairly accurate reckoning of the physical ability of the freight transport network to weather a fuel crisis, but that it is impossible to say in advance what freight carriers will in fact do with the network.

From National Energy Uses Conference for Transportation; San Antonio, Texas, April 13, 1980.

Hooker, JN

Oak Ridge National Laboratory CONF-800486-1, 1980, 31p

Contract W-7405-ENG-26

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16 323349

**THE ENERGY NEEDS OF TRANSPORT**

The author discusses the need for a statement on future transport energy supplies, so that research and development of new vehicles can proceed. Economies should be introduced to minimise the demand for oil-based products and provision made to meet a possible shortfall in energy by the year 2000. Operating costs are compared for road, rail and air transport modes. An equation is derived which is designed to evaluate the economics of changing a vehicle for one of lower energy consumption. A number of measures are discussed which can reduce vehicle energy consumption such as aerodynamics, route planning, journey timing, incentives for energy efficient modes, and, encouragement of high maintenance standards. It is concluded that the long-term objective must be a higher gdp for a smaller increase in transport energy consumption.

Cheeseman, IC *Transport* Vol. 1 No. 1, Mar. 1980, pp 9-13, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 249858)

ORDER FROM: City Press Limited, Fairfax House, Colchester, England

16 323368

**SAVINGS IN TRANSPORTS: THE RAILWAYS' TRUMP CARDS**

[Economies dans les transports: Les formidables atouts du rail]

Among the sources of energy which will replace traditional resources, hydraulic and nuclear energy are in the fore. As they are usable only once they are transformed into electricity, they are one of the major trump cards held by the railways. Indeed at the moment the railway represents only 6% of the total consumption of energy obtained from oil and used for transport. In the case of a serious crisis they would have to double their transport of goods and increase their passenger traffic by 50%, as figures prove that rail is the transport mode that constitutes least energy per gep (gramme equivalent petrole-gram equivalent petrol) per seat and km, and per ton and kilometer. Additional savings in the use of railways could be made through the construction of new high-speed electrified lines, the application of new techniques to improve energy output, the development of container transport, and the development of urban public transport. It appears therefore desirable to favour the development of railways, the role of which is and will remain of prime importance. [French]

*Le Rail et le Monde* Vol. 10 No. 295, Mar. 1980, pp 6-10, 3 Tab., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109779), Central Laboratory of Bridges & Highways, France, Bureau Central d'Etudes pour les Equip Outre-mer  
ORDER FROM: OFERMAT, Rue la Bruyere 38, Paris, France

16 323431

**LARGE TWO-CYCLE DIESELS ARE FUEL-TOLERANT**

Tests of off-specification fuels in a large two-cycle medium-speed diesel engine indicate that it is a very fuel-tolerant engine, able to operate without modification on fuels having properties far outside the range of No. 2 diesel fuel specifications. The fuel system is the limiting factor in using high viscosity fuel, being unable to deliver enough fuel for normal operation above a particular viscosity for each fuel rate.

*Automotive Engineering* Vol. 88 No. 5, May 1980, pp 59-64

ACKNOWLEDGMENT: EI

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16 323470

**ALTERNATIVE ENERGY SOURCES FOR NON-HIGHWAY TRANSPORTATION (APPENDICES)**

A planning study was made for DOE on alternate fuels for non-highway transportation (aircraft, rail, marine, and pipeline). The study provides DOE with a recommendation of what alternate fuels may be of interest to non-highway transportation users from now through 2025 and recommends R & D needed to allow non-petroleum derived fuels to be used in non-highway transportation. Volume III contains all of the references for the data used in the preliminary screening and is presented in 4 subvolumes. Volume IIIA covers the background information on the various prime movers used in the non-highway transportation area, the physical property data, the fuel-prime mover interaction and a review of some alternate energy forms. Volume IIIB covers the economics of producing, transporting, and distributing the various fuels. Volume IIIC is concerned with the environment issues in production and use of the fuels, the energy efficiency in use



and production, the fuel logistics considerations, and the overall ratings and selection of the fuels and prime movers for the detailed evaluation. Volume IIID covers the demand-related issues.

Exxon Research and Engineering Company DOE/CS05438T1 (Vol 3), June 1980, 560p

Contract AC05-77CS05438

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

#### 16 323472

##### SOLID FUEL APPLICATIONS TO TRANSPORTATION ENGINES

The utilization of solid fuels as alternatives to liquid fuels for future transportation engines is reviewed. Alternative liquid fuels will not be addressed nor will petroleum/solid fuel blends except for the case of diesel engines. With respect to diesel engines, coal/oil mixtures will be addressed because of the high interest in this specific application as a result of the large number of diesel engines currently in transportation use. Final assessments refer to solid fuels only for diesel engines. The technical assessments of solid fuels utilization for transportation engines is summarized: solid fuel combustion in transportation engines is in a non-developed state; highway transportation is not amenable to solid fuels utilization due to severe environmental, packaging, control, and disposal problems; diesel and open-cycle gas turbines do not appear worthy of further development, although coal/oil mixtures for slow speed-diesels may offer some promise as a transition technology; closed-cycle gas turbines show some promise for solid fuels utilization for limited applications as does the Stirling engine for use of cleaner solid fuels; Rankine cycle engines show good potential for limited applications, such as for locomotives and ships; and any development program will require large resources and sophisticated equipment in order to advance the state-of-the-art.

Mueller Associates, Incorporated DOE/CS/56051-T2, June 1980, 76p  
Contract AC05-79CS56051

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

#### 16 324432

##### THOUGHTS ON AN IDEAL DIESEL FUEL FROM COAL

The paper is an attempt to analyze the various fuel properties that influence the performance of a CI engine and to formulate specifications for the ideal diesel fuel. The result postulates that the ideal diesel fuel can only be a synthetic fuel obtained from coal by the Fischer-Tropsch process with fixed bed, since this process preferably furnishes straight-chained hydrocarbon or those with few branches. This is a feature of the process which is undesirable for the production of synthetic petrol, but highly desirable for the production of an energy-saving and anti-pollution ideal diesel fuel.

Hardenberg, HO (Daimler-Benz, West Germany) *South African Mechanical Engineer* Vol. 30 No. 2, Feb. 1980, pp 34-47

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 16 324434

##### MINERALS TRANSPORT--TRENDS IN ENERGY EFFICIENCY

The paper deals primarily with railroad transport, with special emphasis on energy efficiency. With the resurgence of coal in the United States the railroads are being called upon to handle large tonnages over very long distances. Consumption of locomotive diesel fuel to handle these ton-miles becomes a very significant cost item. Some of the approaches being taken to use this fuel more efficiently are discussed. Among the points covered are locomotive design improvements, operating procedures, lighter weight cars and freight car trucks. Rail transport is an energy efficient means of overland transport, especially when used to haul bulk commodities over long distances in unit trains. Continuing advances in equipment and operating practices may further improve fuel efficiency on the order of another 10%-20%. To achieve still further improvements in fuel efficiency, conversion to alternative propulsion means would be necessary.

American Mining Congress Mining Convention, Session Papers, Set 10, Los Angeles, California, September 23-26, 1979.

Eldridge, CC (Bechtel Corporation); van Gorp, PH  
American Mining Congress 1979, 14p

ACKNOWLEDGMENT: EI

ORDER FROM: American Mining Congress, Ring Building, 1200 18th Street, NW, Washington, D.C., 20036

#### 16 324503

##### PROPERTIES OF USSR, USA AND CANADIAN RR CAR JOURNAL BOX OILS

As part of an exchange programme, two USSR railroad car journal box oils, a summer and northern grade, were received in Canada in 1976 for laboratory testing. Testing of the USSR oils and various refined and re-refined Canadian oils revealed that the two dark-coloured USSR oils are widecut, and more aromatic and polar than Canadian oils, presumably having been made from aromatic/naphthenic crude which has also given them a low viscosity index. Both USSR oils show excellent demulsibility and anti-rust properties and both probably contain an anti-friction additive. The USSR summer oil has a viscosity at 100 deg C comparable to that of a Canadian summer oil, but the USSR northern oil has very low viscosities over a broad temperature range suggesting application for far northern regions, e.g., Siberia. Data from the testing of five USA oil samples obtained in September, 1978 are appended. Two of these oils (premium, refined) like the USSR oils are aromatic/naphthenic and polar, but, unlike the USSR oils, have a VI greater than 100.

Strigner, PL *Lubrication Engineering* Vol. 36 No. 7, July 1980, pp 390-400

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

#### 16 324504

##### EFFECT OF WATER ON THE PERFORMANCE OF RAILROAD JOURNAL ROLLER BEARING GREASE

Railway journal roller bearings submitted to environmental conditions such as floods, heavy rains and snow are susceptible to the intrusion of water. Generally, it is claimed that water contamination has an unfavourable effect on grease lubricants and bearing components. A laboratory analysis was conducted on AAR (Association of American Railroads)-recommended journal roller bearing greases and one other to assess variations in grease properties such as load-carrying capacity, leakage tendency and corrosive effect relative to water content. In addition to the customary laboratory procedures of analysis, grease samples were subjected to a controlled "rig test" using tapered journal roller bearings to determine mechanical stability of the greases and to examine resultant bearing condition. Results of the tests conducted show that the effect of water varied with each grease; and one of the group was unaffected by water in the amount of ten per cent.

Yasui, H *Lubrication Engineering* Vol. 36 No. 6, June 1980, pp 353-360

ACKNOWLEDGMENT: British Railways  
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DOTL JC

#### 16 324687

##### WHAT WILL POWER FUTURE NON-HIGHWAY TRANSPORTATION?

Exxon researchers have completed a study for the Dept. of Energy to identify alternate fuels and prime movers which should be of most interest for each mode of non-highway transportation from the present to the year 2000 and beyond. Eighteen different alternative fuels were considered and represented by three different resource bases. Methane and hydrogen in both gaseous and liquified form were considered as well as electricity as an energy carrier. Initially, synthetic fuels are likely to be commingled with petroleum products since they may be refined in existing facilities. Engines used in non-highway transportation generally last 20 years or more and thus fuels similar to current products will be needed for the next 20 to 30 years.

*Automotive Engineering* Vol. 87 No. 10, Oct. 1979, pp 82-87

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 16 324911

##### MEASUREMENT OF ENERGY SAVING BY REGENERATIVE BRAKING IN RAILBORNE TRACTIVE UNITS [Messung der Energieersparnis durch die Nutzbremse bei Schienengebundenen Triebfahrzeugen]

Tests performed in Hanover, West Germany, involving trial runs under service conditions, are reported. The purpose of these tests was to check the results of theoretical investigations about the level of energy savings due to

the use of tractive units with regenerative braking. The energy savings measured were between 24% and 29%. The influence of vehicle design, timetable and the feeding conditions within the energy supply network are discussed. [German]

Moellendorff, H von (AEG-Telefunken) *Elektrische Bahnen* Vol. 78 No. 1, Jan. 1980, pp 21-25, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

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## 16 324916

## GENERAL VIEWPOINTS ON RATIONALISATION OF ENERGY CONSUMPTION IN ELECTRIC TRACTION ON THE CSD

[Obecná hlediska energetické racionalizace v elektrické vozbe v podmínkách CSD]

No Abstract. [Czech]

Opava, J *Doprava* Vol. 22 No. 3, July 1980, pp 202-212, 6 Fig., 5 Tab., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Nakladatelství Dopravy a Spoju, Hybernska 5, 115 78 Prague 1, Czechoslovakia

## 16 324940

## ENERGY SUPPLY AND REQUIREMENTS OF TRANSPORT AND PROPULSION SYSTEMS [Energieversorgung und Energiebedarf von Antriebs- und Transportsystemen]

The author begins by discussing the energy situation and the levels of energy consumption of the various transport systems, and then moves on to the supply of energy for vehicle propulsion systems, and the energy requirements of transport systems. The specific, favourable consumption of the railways are governed by laws of physics and by operating methods. [German]

Voss, G *Eisenbahntechnische Rundschau* Vol. 29 No. 3, Mar. 1980, pp 153-158, 2 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

## 16 325471

## THE ENERGY CRISIS AND INTERMODAL COMPETITION

This paper analyzes the effects of recent changes in the supply and price of energy on freight transport modes. This is accomplished by studies of the relative energy efficiency of the modes, the relative energy cost intensity of the modes, and the effects of government intervention. Relative modal energy efficiency is analyzed by comparing similar types of service. This approach goes beyond simple comparison of aggregate fuel efficiency data. The conclusion reached is that the relative efficiencies change for different types of service. Energy cost intensity is an important component of the effect of fuel price increases on relative modal competitiveness. Fuel costs are now approximately 55 percent of total waterway operating costs, 24 percent of total truck costs, and 12 percent of total rail costs. Therefore, as energy costs increase, barge costs increase the most, and rail costs increase the least. Government control of the price and supply of energy can prevent railroads from realizing cost and efficiency advantages. Also, the regulatory system creates a lag in railroad recovery of rising fuel costs. The main implication here is that increasing energy costs will improve the competitive position of the rail industry. However, such an improvement may be circumvented by government intervention in the energy market. (Author)

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck and Intermodal.

Paxson, DS *Transportation Research Record* No. 758, 1980, pp 89-92, 5 Tab., 7 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

## 16 325472

## TRANSPORTATION ENERGY ALTERNATIVES: IMPLEMENTATION STRATEGIES

The approaches examined in this report as means of displacing natural petroleum differ substantially in their potential savings. Because U.S. transportation depends almost completely on liquid fuels derived from crude

oils, three promising methods are examined for saving of petroleum-based fuels: (1) Manufacture of synthetic liquid fuels from abundant U.S. coal and oil shale; (2) Revitalization of electric vehicle technology because electricity could be derived from coal-or nuclear-fueled generating plants; (3) Electrification of mainline railroads, following the common practice of many other nations. This final report integrates research findings of previous studies and estimates to what extent synfuel, electric vehicles and railroad electrification might displace petroleum-based fuels by the year 2000. Although synfuels are most likely to displace significant quantities of imported petroleum during this century, over the long term electric vehicles and railroad electrification could also displace meaningful quantities at comparable costs. None of the technologies seems likely to be widely deployed soon without government involvement.

Dickson, EM Freeman, TA Conley, DE Scott-Walton, BL  
SRI International, Department of Energy Final Rpt. No. 117, June 1980, 284p, 9 Tab., Apps.

ORDER FROM: SRI International, 333 Ravenswood Avenue, Menlo Park, California, 94025

## 16 325749

## ENERGY CONSUMPTION OF TRAFFIC CARRIERS [Der Energieverbrauch der Verkehrstraeger]

The energy consumption values per transport unit (vehicle kilometers driven, gross ton kilometers, net ton kilometers, passenger kilometers) of the following traffic carriers are compared: rail, road, shipping and pipeline. As well as average consumption values, the effects of rail section characteristics, comfort, weight, speed, amount of loading and distances between stations on energy consumption is given for diesel, steam-powered and electric trains. A comparison of energy used per ton kilometer for freight transport by lorry or rail showed that on average roughly twice as much energy has to be used on the road as on rail. A comparison of passenger kilometers shows that the car, when full, (despite low weight per seat) does not have a low specific energy consumption value; it corresponds to the values of a slow train which is half full or a fast train which is only 20 percent full. [German]

Kapfer, E *OEBB Journal* No. 8, 1979, pp 10-16, 2 Fig., 8 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 309422), Road Safety Board, Austria  
ORDER FROM: Road Safety Board, Austria, Oelzeltgasse 3, A-1030 Vienna, Austria

## 16 325798

## FUEL EFFICIENCY IN FREIGHT TRANSPORTATION

Barge transportation is the most fuel efficient method of moving the raw materials and semi-finished products needed by the nation's economy. This study reviews the record of extensive research on this vital issue and provides a finding that lends new perspective to energy efficiency in transportation. A number of studies of fuel efficiency have been sponsored over the past several years by the Department of Transportation and the Department of Energy. These studies show that shallow-draft water transportation consumes considerably less energy in producing equivalent freight transportation than alternative modes. Even when circuitry (the lack of straight-line water routes between cities) is taken into account, the energy efficiency of the barge and towing industry is superior. These analytical findings are confirmed by a survey of barge operators and reinforced by specific examples--of grain movements from Minneapolis to the Gulf Coast, and of coal movements covering 25 million tons to steam generating plants of the Tennessee Valley Authority. All bulk transport modes make significant contributions to the nation's distribution system in a highly fuel-efficient manner. Any transportation energy policy must recognize and promote the utilization of the inherent advantages of all of the fuel-efficient modes of transportation.

Eastman, SE  
American Waterways Operators Incorporated June 1980, 17p

ORDER FROM: American Waterways Operators, 1600 Wilson Boulevard, Arlington, Virginia, 22209 Water Transport Association, 60 East 42nd Street, New York, New York, 10017

## 16 325903

## ENERGY CONSERVATION ON BRITISH RAIL

In common with other transport providers British Rail is concerned to save fuel and the new Advanced Passenger Train is an efficient user of energy. Moreover, if 50 per cent of the rail system could be electrified 126m gallons of oil a year would be saved. In this article the Chairman of the Railways

Board also makes his case for a low cost Channel tunnel, and gives a warning that BR's financing and investment limits must be eased if rail services are to be improved.

Parker, P *Coal and Energy Quarterly* No. 24, 1980, pp 10-15

ACKNOWLEDGMENT: EI

ORDER FROM: National Coal Board, Hobart House, Grosvenor Place, London SW1X 7AE, England

#### 16 325904

##### **ECONOMIZING IN USAGE OF ENGINE OILS IN OPERATION OF RAILROAD DIESELS**

Results of a field test program are presented which was undertaken to improve the service life of lubricating oils used in diesel locomotives on the Russian railroads. Extensive experimental data are tabulated, plotted, and discussed in terms of recommendations for practice, given in details for each of operating railroad diesels.

Adamenko, SP Zelenetskaya, IS *Chemistry and Technology of Fuels and Oils* Vol. 15 No. 7-8, July 1979, pp 586-590, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

#### 16 326008

##### **ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 1: SUMMARY REPORT**

This report presents an analysis of Transit Energy Consumption in several urban areas. A total of ten urban areas were selected for individual case studies. In each of these ten areas, an analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation- such as traction power, control power, and in maintenance and construction.

See also Volume 2, PB80-208432. Also available in set of 13 reports PC E99, PB-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C International Business Services, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. 91910-VOL-1, Dec. 1979, 117p

Contract DOT-OS-80105

ACKNOWLEDGMENT: NTIS

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PB80-208424

#### 16 326009

##### **ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 2: ANALYSIS OF WASHINGTON, DC**

This report presents an analysis of Transit Energy Consumption in Washington, DC. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 1, PB80-208424 and Volume 3, PB80-208440. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C International Business Services, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. 91910-VOL-2, Dec. 1979, 105p

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#### 16 326010

##### **ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 3: ANALYSIS OF BALTIMORE, MARYLAND**

This report presents an analysis of Transit Energy Consumption in Baltimore, MD. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 2, PB80-208432 and Volume 4, PB80-208457. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C International Business Services, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. 91910-VOL-3, Dec. 1979, 77p

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#### 16 326011

##### **ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 4: ANALYSIS OF BOSTON, MASSACHUSETTS**

This report presents an analysis of Transit Energy Consumption in Boston, MA. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 3, PB80-208440 and Volume 5, PB80-208465. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C International Business Services, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. 91910-VOL-4, Dec. 1979, 105p

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PB80-208457

#### 16 326012

##### **ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 5: ANALYSIS OF MIAMI, FLORIDA**

This report presents an analysis of Transit Energy Consumption in Miami, FL. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 4, PB80-208457 and Volume 6, PB80-208473. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C International Business Services, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. 91910-VOL-5, Dec. 1979, 81p

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16 326014

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 7: ANALYSIS OF SAN FRANCISCO, CALIFORNIA**

This report presents an analysis of Transit Energy Consumption in San Francisco, CA. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 6, PB80-208473 and Volume 8, PB80-208499. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-7, Dec. 1979, 110p

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16 326015

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 8: ANALYSIS OF SAN DIEGO, CALIFORNIA**

This report presents an analysis of Transit Energy Consumption in San Diego, CA. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 7, PB80-208481 and Volume 9, PB80-208507. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-8, Dec. 1979, 83p

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16 326016

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 9: ANALYSIS OF CHICAGO, ILLINOIS**

This report presents an analysis of Transit Energy Consumption in Chicago, IL. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 8, PB80-208499 and Volume 10, PB80-208515. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-9, Dec. 1979, 83p

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16 326017

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 10: ANALYSIS OF PORTLAND, OREGON**

This report presents an analysis of Transit Energy Consumption in Portland, OR. An analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation-such as traction power, control power, and in maintenance and construction.

See also Volume 9, PB80-208507 and Volume 11, PB80-208523. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-10, Dec. 1979, 73p

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16 326018

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 11: ANALYSIS OF TORONTO, ONTARIO, CANADA**

This report is part of the Transit Energy Consumption and Federal Policy Study that analyzes the way in which energy consumption and conservation has been considered in the planning, development, and operation of public transit systems in selected cities. Although Toronto, Canada, is not subject to U.S. Federal policy, it is pertinent to observe this system as an example and comparative element in this study. Toronto has a successful transit system, and it is useful to observe the differences in policy and planning. The report discusses each and all of the transit operators and the general characteristics of the Toronto Metropolitan Area. Each transit operator is discussed in terms of function, structure, facilities and equipment, and utilization and operations.

See also Volume 10, PB80-208515 and Volume 12, PB80-208531. Also available in set of 13 reports PC E99, PB80-208416.

International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs 91910-VOL-11, Dec. 1979, 66p

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16 326019

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND FEDERAL POLICY. VOLUME 12: ANALYSIS OF THE CAPITAL GRANT APPLICATION DECISION PROCESS**

This report presents an analysis of Transit Energy Consumption in several urban areas. A total of ten urban areas were selected for individual case studies. In each of these ten areas, an analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation- such as traction power, control power, and in maintenance and construction.

See also Volume 11, PB80-208523 and Volume 13, PB80-208549. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-12, Dec. 1979, 55p

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16 326020

**ANALYSIS OF TRANSIT ENERGY CONSUMPTION AND  
FEDERAL POLICY. VOLUME 13: ANALYSIS OF SYSTEM  
CONSTRUCTION ENERGY**

This report presents an analysis of Transit Energy Consumption in several urban areas. A total of ten urban areas were selected for individual case studies. In each of these ten areas, an analysis was made of the existing transit system, planned systems, and the transit planning process in that region. Separate studies were made of Construction Energy Consumption and of the DOT Capital Grant Application Process and the type of energy analysis used in that process. The analysis of the current and planned systems was directed at finding the source and amount of energy consumed for each of several factors in operation- such as traction power, control power, and in maintenance and construction.

See also Volume 12, PB80-208531. Also available in set of 13 reports PC E99, PB80-208416.

Weirich, R Burgwald, B Cole, W Adams, A Wagner, C  
International Business Services, Incorporated, Asst Secretary for Policy  
& International Affairs Final Rpt. 91910-VOL-13, Dec. 1979, 85p

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16 326266

**THE ENERGY ADVANTAGES OF PUBLIC TRANSPORTATION.  
EXECUTIVE SUMMARY**

This report addresses the total energy advantage of public transportation, considering both auto and transit energy consumption as well as residential energy consumption and residential mix. The relative modal efficiencies, spatial structure, and residential energy consumption are considered in some detail. The focus is on petroleum-based energy. Regional variations are noted.

See also PB80-226129.

McShane, WR Bloch, A Ihlo, W  
Polytechnic Institute of New York, Urban Mass Transportation  
Administration, (UMTA-NY-11-0021) UMTA-NY-11-0021-80-1, Mar.  
1980, 12p

ACKNOWLEDGMENT: NTIS

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16 326267

**THE ENERGY ADVANTAGES OF PUBLIC TRANSPORTATION**

This report addresses the total energy advantage of public transportation, considering both auto and transit energy consumption as well as residential energy consumption and residential mix. The relative modal efficiencies, spatial structure, and residential energy consumption are considered in some detail. The focus is on petroleum-based energy. Regional variations are noted.

See also PB80-226111.

McShane, WR Bloch, A Ihlo, W  
Polytechnic Institute of New York, Urban Mass Transportation  
Administration, (UMTA-NY-11-0021) UMTA-NY-11-0021-80-2, Mar.  
1980, 84p

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PB80-226129

17 316329

**TERMINAL MANAGEMENT INFORMATION SYSTEMS-DESIGN AND PERFORMANCE REQUIREMENTS**

In most existing container terminals, handling equipment is largely manually operated, and the function of computer information and control systems is effective information gathering, evaluation, transmittal and display. Small use to-date, has been made of information in the direct on-line control of terminal equipment. In the near future, however, automation will be increasingly used for such operations and, in order to ensure that manual and complex automated technological systems are integrated into a co-ordinated network of terminal activities which will operate at optimum efficiency and economy, the question of implementation and the degree of use of a formal Container Terminal Management Information System (CTMIS) becomes more important. In this article, Ernst G Frankel of E G. Frankel Inc Port Engineers and Transportation Consultants, and Diomedes Liu, vice-president of JET Technical Services Inc, outline the objectives, functions and performance requirements of container terminal management information systems under conditions of rapidly changing terminal technology and user needs. The main purpose of a Container Terminal Management Information System (CTMIS) is to provide a flow of information which facilitates the timely planning and control of container terminal operations. To achieve this goal, the functional relationships between all physical and operational factors must be established and the interface between terminal operations and user requirements, including interacting external operations, must be determined.

*Cargo Systems International* Vol. 7 No. 6, June 1980, p 89

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17 319682

**SOME BENEFITS OF COMPUTERIZED CONTROL OF RAILROAD OPERATIONS**

The potential of computer systems has barely been tapped by the railroad industry in its efforts to achieve more effective operations, car utilization and higher levels of customer service. This study brings together some of the research that has been done in these areas and adds some ideas that may help the railroads to realize more of the computer's potential. It was felt that a better management system is required for the effective use of a computer-based railroad Operations Control System (OCS) and that the OCS could be developed in such a way as to help create this better system. Technical facets of car utilization are discussed in terms of how they relate to the general management system and the OCS. This discussion includes the role that an improved railroad management system built around an OCS could have in a improving railroad operations, including better car blocking practices, elimination of excessively long trains, and improved yard operations. The capabilities of several railroad computer systems are considered along with additional capabilities that could be programmed into an OCS to increase effectiveness.

White, WJ

Indiana University, Bloomington Dissertatn 1979, 329p, 5 Fig., 37 Tab.

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48106

DOTL TF507.W54

17 319921

**EFFECTS OF FREIGHT CAR STENCIL CHARACTERISTICS ON LEGIBILITY**

This report describes the results of a study to provide a set of guidelines to develop optimum stencil specifications by defining the problems of the legibility of information stenciled on freight cars. Legibility problems under conditions of both direct observation and using closed circuit television (CCTV) were examined. The recommended stencil guidelines are based on: 1) a review of the literature, 2) observations at railroad classification yards, 3) a series of photometric studies, both in the laboratory and in a classification yard, 4) interviews with yard clerks experienced with CCTV stencil legibility, and 5) the legibility performance of yard clerks viewing 330 cars with various stencil properties presented in a test video tape.

Rockwell, TH Roach, DE

R&R Research, Incorporated AAR R-441, Aug. 1980, v.p., Figs., Tabs., 5 Ref., 4 App.

ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

17 319931

**COMPUTERIZED CAR SCHEDULING: IN BUSY TIMES, A SERVICE TOOL; IN BAD TIMES, A COST-CUTTER**

In the face of reduced freight traffic, the Transportation Control System of Missouri Pacific is being called upon for the first time to provide a satisfactory level of freight service at substantially lower cost rather than its normal goal of providing a high level of customer service. This management information system with its automated car scheduling is gradually being extended over the entire railroad but maximum benefit will require further extension. This would involve the industry to enhance its carrier-to-carrier and shipper-to-carrier data exchange, adopt interline scheduling and expand the functional capability of TCS.

Welty, G *Railway Age* Vol. 181 No. 15, Aug. 1980, pp 26-27, 1 Phot.

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**WAYBILL STATISTICS SYSTEM (1969-)**

All Class I line-haul railroads are required to submit the FRA (ICC) copies of all waybills when waybill numbers end with 01. (1% Sample) Sample coverage includes import, export, transit, rebilled, and piggyback traffic. Excluded are shipments weighing less than 10,000 lbs. and moving on less than carload rate on any quantity rates and traffic originating in Mexico and Canada. Principal data elements are serial and waybill number, number of carloads; origin and destination railroads, station and territories; rate types, STCC, weight and revenue, short line mile and AAR car type. Principal Report: 1) (Annual) Carload waybill statistics-presents volume and revenue data for railroad freight shipped within the (USA) during the year, by commodity and by region of shipment origin and destination. 2) Carload waybill analyses, territorial distribution, traffic and revenue by commodity groups (Quarterly) 3) Carload waybill analyses, distribution of freight traffic and revenue averages by commodity groups and rate territories, (Quarterly).

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Federal Railroad Administration Annual No Date, n.p.

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**AAR REVENUE FREIGHT LOADED BY COMMODITIES AND TOTAL RECEIVED FROM CONNECTION (CARLOADING REPORT, STATEMENT CS-54A)**

Weekly report by railroad and operating district of carloads of revenue freight by 21 commodity fields loaded during seven-day period. Data are compared with same week of previous year. Report includes cumulative carloading data by district and comparison with two previous years carloadings by commodity type. Major data content: nationwide weekly carloadings by commodity, by railroad.

Magnetic Tape (Annual), Paper copy (Weekly). All data must have American Association of Railroads approval before release to the public.

Association of American Railroads Weekly No Date, n.p.

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**REVENUES, EXPENSES AND STATISTICS OF FREIGHT FORWARDERS, STATEMENT Q-950, SINCE 1943**

Compiled from quarterly reports of forwarders having gross yearly revenues of \$100,000 or more. Report on freight forwarder operating revenues, expenses, income, tons of freight and number of shipments received from shippers, with comparative data for the previous year. Shows totals by financial category and selected financial data and shipment volume by individual company.

Hardcopy.

Interstate Commerce Commission Semiannual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (278)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

17 320279

**INDEXES OF AVERAGE FREIGHT RATES ON RAILROAD CARLOAD TRAFFIC, 1947/50-PRESENT**

Includes indexes (1950 equals 100) of average freight rates for commodity groups and selected commodity classes, for territorial movement in total and by commodity group, for inter-and interstate rates by commodity group, by commodity groupings corresponding to Bureau of Labor statistics classification for wholesale commodity price index: bituminous coal at commodity rates in official territory.

Hardcopy.

Interstate Commerce Commission Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (279)  
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17 320281

**CLASS I LINE-HAUL RAILROADS SELECTED EARNINGS DATA**

Report on Class I line haul railroads operating revenues, income, rate of return, and ton-miles of freight, by district and individual railroad, including the National Railroad Passenger Corp. Contains 1 table showing data for quarter of coverage, previous 12 months, and the same periods of the previous year.

Hardcopy.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (281)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

17 320286

**QCS FREIGHT COMMODITY STATISTICS, CLASS I RAILROADS, 1964-PRESENT**

"Total" carload and tonnage figures represent double accounting as the traffic which a single railroad both originates and terminates is counted twice. No shipper/consignee point-to-point flow data is included. File consists of data on freight traffic of commodities on Class I railroads (railroads with average annual operating revenues of \$5 million or more). Data for each commodity include: revenue freight originated by type (terminating on-line, delivered to connecting carriers), revenue freight received from connecting carriers by type, total revenue freight carried, gross freight revenue.

Magnetic Tape (Annual Data only) and Hardcopy report (Quarterly). Report requires Interstate Commerce Commission approval before release to the public.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (286)  
ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, 12th Street & Constitution Avenue, NW, Washington, D.C., 20423

17 320289

**NETWORK TAPE**

This tape cross references the: Railroad number (three digit), Association of American Railroad (AAR) "automatic car identification carrier conversion number" which identifies a carrier: FSAC code which, when combined with the railroad number, uniquely identifies the station: City name where the station from above is located: State abbreviation: SPLC code standard point location code of the form SSCCPP when SS identifies the state, SSCC uniquely identifies the county and the six digits identify the point: Node, FRA railway node in their network.

Two tapes, 9-track, 800 BPI, ASCII.

Federal Railroad Administration No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (289)  
ORDER FROM: FRA

17 320299

**YEARBOOK OF RAILROAD FACTS**

Pocket size compendium of railroad statistics for the U.S. and for the three principal districts to which railroads are assigned for statistical purposes. Data generally covers Class I railroads. Major content: condensed income account, revenues and expenses, taxes by states, net earnings, rate of return, revenue carloadings by district, by commodity group, TOFC loadings,

distribution of intercity freight ton-miles by mode, freight train-miles, average tons per freight carload, railroad mileage by state, locomotives and freight cars in service, railroad employment by state, price and wage index, etc.

Hardcopy.

Association of American Railroads Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (299)  
ORDER FROM: AAR

17 320300

**COMPENSATION OF OFFICERS, DIRECTORS, ETC., CLASS I RAILROADS, LINE-HAUL SWITCHING & TERMINAL CO. 1933**

Lists by name of company, the title of position and salary per annum as of the close of the year and other compensation for position paid \$20,000 or more per year. Also contains summary tables.

Hardcopy.

Interstate Commerce Commission Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (300)  
ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, 12th Street & Constitution Avenue, NW, Washington, D.C., 20423

17 320303

**MOTIVE POWER AND CAR EQUIPMENT OF CLASS I RAILROADS IN THE U.S. STATEMENT Q-240; 1936-PRESENT**

This file provides a preliminary indication of the status and utilization of railroads equipment. The primary use of these data will be in network analysis. The file lists locomotives assigned to road freight, road passenger and yard-switching service and also freight and passenger cars and motorcars owned, and home/foreign cars on line.

Hardcopy. All Class I railroads are required to submit form OS-C on a quarterly basis to Interstate Commerce Commission.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (303)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

17 320304

**TRAIN AND YARD SERVICE OF CLASS I RAILROADS IN THE UNITED STATES, STATEMENT Q-210; 1964-PRESENT**

Data including miles of road operated, train and locomotive unit miles, and car miles; gross ton-miles of road locomotives and tenders, gross ton-miles of cars, contents and cabooses, net ton-miles, train, train switching, and yard switching hours.

Hardcopy. All Class I Railroads are required to submit a form OS-A on a quarterly basis to the Interstate Commerce Commission.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (304)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

17 320721

**FREIGHT STATION ACCOUNTING CODE DIRECTORY AS OF 1974**

Directory of the alphabetical and numerical listing of stations, followed by standard point location code number, which is cross-referenced. It provides for the standardized showing of the station accounting numbers for both the waybilling and receiving stations, as a means of accurate and economical revenue apportionment among carriers and the verification thereof on interline movement, and for the compilation of statistical data. (Code reference)

Hardcopy. (\$4.50/copy).

Association of American Railroads Irregular No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (721)  
ORDER FROM: AAR

17 320722

**REVENUE PIGGYBACK AND CONTAINER TRAFFIC-CLASS I RAILROADS FORM PTR-R (1971-)**

A report of selected operating and financial statistics covering piggyback-/container traffic movements. Major item: Trailer and container movements

by type: Service categorized by originating on respondent line and received from connecting railroads—Data shown for each type of service: 1) Quantity of trailers and containers; 2) Weight; 3) Gross Revenue; and 4) Unit miles. Railroad collection process may vary. Being limited in scope and content, data are useful only for disaggregating and making seasonal adjustments to annual data.

Hardcopy and Magnetic tape. Individual reports are not open to the public. Data are published irregularly in summary form. All Class I railroads are required to submit piggyback traffic statistics to the ICC on a quarterly basis.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (722)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

#### 17 320725

##### TELERAIL AUTOMATED INFORMATION NETWORK--II (TRAIN II)

A computer data processing system initiated by the AAR to expedite the reporting and timely allocation of freight cars using real-time car movement data reported to the car service division. It eliminates several previous written reports filed by individual railroads with the AAR and provides real-time car tracing capabilities. Major data content: 1. Interchange reports between railroads 2. Regional boundary crossing report 3. Waybill data 4. Empty car disposition report 5. Waybill car record 6. Waybill summary record 7. Car movement data: A. Release loaded/empty B. Arrival time at destination/placement C. Load order/storage D. Load and/or empty.

Machine readable. Availability presently limited to Association of American Railroads member railroads.

Association of American Railroads Periodic No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (725)  
ORDER FROM: AAR

#### 17 320837

##### SHORT LINE MILEAGES

Short line mileages are calculated by a computer program as required for use in processing the ICC one percent waybill sample, new short line mileages are calculated and retained. A magnetic tape is available encompassing origin station, FSAC and short line mileages which have occurred in the course of the sample.

Magnetic tape. Data are computed by a computer program.

Federal Railroad Administration One-Time No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (837)  
ORDER FROM: FRA

#### 17 322015

##### INTEGRATED TRANSPORT CONTROL [Die Integrierte Transport Steuerung]

An Integrated Transport Control system which the German Federal Railway has begun to put into operation is described. At the moment the first upgrading stage is carried out with an expenditure of approx. 600 million DM for the entire network of the German Federal Railway, comprising essentially a centralized rate calculation and accounting in the area of freight traffic and a train information and announcing system. The technical infrastructure comprises a network of computers, approx. 4000 stationary and approx. 2000 portable data stations. First applications were introduced in the area of the Commercial Service. [German]

Schieneverkehr-Zukunft mit Vernunft, Fachvortrag, Hamburg, Germany, June 12-14, 1979.

Schenk, O *ETG-Fachberichte* No. 4, 1979, pp 5-13

ACKNOWLEDGMENT: EI  
ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

#### 17 322183

##### MISSOURI PACIFIC RAILROAD ENHANCED CAR DISTRIBUTION SYSTEM -FEASIBILITY STUDY

This study examined the existing MoPac Car Distribution system and the DSAI Car Distribution Model produced by Decision Systems Associates, Inc. The study determined in general terms the software, procedures, and reports required to support an enhanced system, and estimated MoPac

manpower and computer costs required to develop and implement such a system. Gondolas were suggested for a pilot project which would be a modification of the existing distribution practice supplemented by the DSAI model.

Phase II, Task 5; Railroad Freight Car Distribution.

Association of American Railroads Sept. 1979, 79p, Figs.

Contract FC-141-79-1

ORDER FROM: AAR

DOTL RP

#### 17 322574

##### "CARLOC" OR "HOW DO CN CUSTOMERS ACQUIRE AN ONLINE (REAL TIME) CAR TRACING SYSTEM?"

The CARLOC dial-in system deals with the tracing of railroad cars, piggyback trailers and containers on a real-time basis. This system is designed for customer utilization regardless of his location, providing he has access to a Telex, TWX or Dataphone. Utilization of the system is very simple and it provides a variety of reports regarding the various phases of activity of each unit.

CR/Proceedings, Conference 1979-Canadian Information Processing Society (CIPS); Data Processing Management Association of Canada (DPMA Canada); Federation de l'Inf du Que (FIQ), Montreal, Quebec, June 25-28, 1979.

Pozniak, AR Boule, JA

Canadian Information Processing Society 1979, pp 184-187

ACKNOWLEDGMENT: EI

ORDER FROM: Canadian Information Processing Society, 243 College Street, West, 5th Floor, Toronto, Ontario M5H 1K5, Canada

#### 17 322789

##### AUTOMATED AUDITING OF CAR REPAIRS

Trailer Train, which spends \$200 million annually for freight car maintenance and repair on a fleet which tops 100,000 intensively utilized cars, has applied a computerized auditing system for its maintenance expenditures. In addition to assuring accuracy of car repair payments, the computer turns the raw information from the AAR billing data base into management reports on shop performance, wear patterns and materials control.

*Progressive Railroading* Vol. 23 No. 8, Aug. 1980, p 73, 1 Phot.

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

DOTL JC

#### 17 322844

##### COMPUTERS GIVE FREIGHT CUSTOMERS A BETTER SERVICE [L'informatique au service de la clientele marchandises]

This article deals with the improved services that are provided for customers using carload transport through the introduction of computer systems. Reference is made to the organization of centralized freight traffic control in the French National Railroads and the services offered customers, especially those with freight to transport. [French]

Perret, P *Revue Generale des Chemins de Fer* No. 98, Nov. 1979, pp 559-565

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

#### 17 322986

##### A NEW METHOD OF REPRESENTING TRANSPORTATION NETWORKS AND ITS APPLICATIONS

This paper proposes a method representing transportation networks which facilitates the description of problems where line segments are dominant. By line segment is meant a railroad line, a train route in a railroad network; or a street, avenue, boulevard or bus route in a road network. As an extension of graphical representation the line network is defined as a hypergraph, each edge of which is a totally ordered set of nodes. Some properties of line network, as well as four basic data structures of it, are stated. Two optimization problems--shortest path and minimal-cost train relay--for line networks are given.

Konya, H *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 2, June 1980, pp 62-66, 14 Fig., 1 Ref.



ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

17 322987

#### STUDY ON AN ON-LINE SIMULATION SYSTEM--TRAIN TRAFFIC SYSTEM FOR THE SHINKANSEN

On the basis of several simulation studies conducted previously and analysis of train traffic system for the Shinkansen railways, it was perceived that computer simulations for a complex system should be carried out in an on-line processing environment. This paper discusses firstly about a general purpose simulation system in an on-line processing environment, next, describes a methodology and a technology of the system, and lastly gives an outline of the train traffic simulation system for the Shinkansen railways, which have been developed.

Satoh, A *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 2, June 1980, pp 67-71, 6 Fig., 3 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

17 322988

#### ROLLING STOCK SCHEDULING BY COMPUTER

A program for rostering rolling stock has been developed. This computerized system is intended to prepare a practical assignment of cars and locomotives taking into consideration all conditions included when the process is done by hand. Conditions which constrain rolling-stock rostering include equalization of arrival and departure of units, provision of proper inspection intervals between runs, assurance of proper inspection and maintenance facilities, assignment of proper types of rolling-stock, assurance that facilities are not overloaded, and provision for peak-period traffic. The locomotive roster for the most heavily used line of JNR (650 freight trains and 280 locomotives) can be generated in about 4 hours by computer as compared with up to 6 days when done manually.

Iida, Y Ohkawa, M *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 2, June 1980, pp 72-79, 8 Fig., 1 Tab., 2 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

17 325276

#### USER-ORIENTED COMPUTER SERVICES

Information processors--computers, terminals and people-- must respond to user's needs on Norfolk and Western. Maximum utility of all management information systems is assured by the regular appraisal of a User Evaluation Committee composed of department heads from all the railroad's functional units. The demanding procedure determines if estimated information system benefits are realistic and that any proposed computer applications complement systems under development for other departments.

Romig, WJ (Norfolk and Western Railway) *Progressive Railroadng* Vol. 23 No. 12, Dec. 1980, pp 29-31, 2 Phot.

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

DOTL JC

17 325277

#### SHIPPER ASSIST MESSAGE SERVICE

The SAM car location service links shippers and railroads via the TRAIN II data lines and makes unnecessary separate tie-ins with individual railroads for car tracing. The result is more information at lower cost.

Meetze, HW (Association of American Railroads) *Progressive Railroadng* Vol. 23 No. 12, Dec. 1980, pp 45-46

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

DOTL JC

17 325460

#### USE OF COMPUTER GRAPHICS FOR THE DISPLAY AND ANALYSIS OF RAILROAD TRAFFIC FLOWS

This paper summarizes efforts to (a) obtain commodity- specific traffic volume data for all lines of the U.S. railroad system, (b) display those data

on a national scale, and (c) analyze and better understand the absolute and relative distribution of the flow of these commodities. The procedure used to generate these data was a standard traffic assignment of historical traffic data contained in the Federal Railroad Administration (FRA) carload waybill statistics. For the purpose of this study, the 1976 waybill statistics report was expanded to match total annual terminating carloads by railroad and commodity as reported in the 1976 quarterly commodity statistics. Princeton University's Railroad Network Model, an enhanced version of the FRA network model, was used to assign these data to the (most likely) path actually traversed by each carload on the U.S. system. The traffic volume assigned to each link by direction of travel and commodity subgroup was accumulated over all carload records. Graphic displays of some of these accumulated volumes are presented.

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck, and Intermodal.

Kornhauser, AL Antush, R *Transportation Research Record* No. 758, 1980, pp 19-24, 13 Fig., 4 Tab., 5 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

17 325745

#### ENERGY-EMERGENCY-MANAGEMENT INFORMATION SYSTEM

The Energy Information Administration (EIA) in the U.S. Department of Energy has undertaken the development of a management information system to be used by Federal and State Officials responsible for dealing with energy emergencies. The system must meet challenging requirements in several areas: (1) It will be multi-fuel in scope, and will require development of an integrated data base interrelating information across fuel types, transportation modes, and end-use sectors; (2) it will serve users at various government levels, and will involve states in the development process; and factual data and forecasts will need to be timely and easily accessible, and communications among users must be facilitated. This paper describes the design approaches being taken by EIA in building an interim system.

From International Conference on energy use Management; Los Angeles, California. Volume 1. of Changing Energy-Use Futures, pp 315-319.

Yaffe, BM (Department of Energy)

Pergamon Press, Incorporated 1979, n.p.

ACKNOWLEDGMENT: Energy Research Abstracts

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

17 326036

#### MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM: ORIENTATION MODULE

The Missouri Pacific Railroad has developed and is implementing a computerized system which will enhance freight car scheduling and overall service. This document summarizes the fundamental concept and describes the design and operation of the system for use on other railroads. It is user oriented in that it describes the input the user is required to make and illustrates, by example, the information that the system provides. It does not describe computer program organization or detailed file structures.

See also PB80-217870.

Missouri Pacific Railroad Company, Federal Railroad Administration Final Rpt. FRA-OPPD-80-2, Mar. 1980, 156p

Contract DOT-FR-65139

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-217862, DOTL NTIS

17 326037

#### MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM: ADVANCED SYSTEMS STUDY

The Missouri Pacific Railroad has developed and is implementing a computerized system which will enhance freight car scheduling and overall service. This document describes the results of an Advanced Systems Study task, the purpose of which was to examine possible further exploitation of the car scheduling system developed under the contract. Reports of six areas examined identify important ways in which car scheduling could possibly be exploited. Missouri Pacific has not yet committed to develop the capabilities as described.

See also PB80-217862.

Missouri Pacific Railroad Company, Federal Railroad Administration  
Final Rpt. FRA-OPPD-80-4, June 1980, 133p

Contract DOT-FR-65139

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-217870, DOTL NTIS

**17 329941**

**LOCOMOTIVE DATA ACQUISITION PACKAGE**

An examination of the problems associated with railroad locomotive data acquisition is presented. The design of a mini-computer-based locomotive data acquisition system (LDAP) is also outlined, with special attention placed on meeting the functional characteristics and the environmental specifications required for the system. Consisting of a magnetic-tape digital data recorder (locomotive data recorder or LDR), an ensemble of transducers, and analysis software, the data acquisition system is to be used as a research tool. The environmental test program and the field test program are also described.

Abbott, RK Kirsten, FA Mullen, DR

American Society of Mechanical Engineers Conf Paper 1980, 15p, 13 Fig., 2 Tab., 3 Ref., 1 App.

ORDER FROM: ESL

DOTL RP

**17 329942**

**EVALUATION TECHNIQUES FOR LOCOMOTIVE  
PERFORMANCE (FUEL ECONOMY, ADHESION, TRACTIVE  
EFFORT)**

With the advent of a computerized data collection and processing system at Southern Pacific, significant advances have been made in measuring the actual operating performance of locomotives. The combination of hardware and software that has been developed has enabled the locomotives' performance to be monitored in real-time, whether it is fuel consumption, tractive effort or adhesion characteristics. On-board, computerized graphical output enhances the usability of the data collected. Performance evaluation techniques are discussed, as are differences between design performance and actual performance. Recommendations are made as to more pertinent measures of performance, based upon output of the locomotive as a system.

Century 2, Engineering Potpourri Conference, Emerging Rail Transportation Technology, Session P-RT-1, August 13, 1980, San Francisco, California.

Andresen, J

Southern Pacific Transportation Company Conf Paper 1980, 18p, 9 Fig.

ORDER FROM: Southern Pacific Transportation Company, 1 Market Street, San Francisco, California, 94105

DOTL RP

18 314395

**A MODEL FOR MEASURING THE IMPACT OF SUBSIDIES ON MASS TRANSIT EFFICIENCY**

The paper develops a theory for the relationship between subsidy and efficiency in mass transportation. Wage per vehicle hour is used as a representative efficiency measure. A theory for the evolution of efficiency levels in transit organizations is developed, and the theory is used to identify the differences in efficiency that could occur between systems identical in every way except for the proportions of their revenues which come from fares and subsidies.

Prepared in cooperation with Indiana Univ. Northwest, Gary.

Barnum, DT Gleason; JM

Nebraska University, Omaha, Urban Mass Transportation Administration  
Spec Rpt. UMTA-NE-11-0002-S, May 1980, 20p

Grant DOT-UMTA-NE-11-0002

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-189277

18 314432

**INVENTORY AND ANALYSIS OF POTENTIAL FUNDING SOURCES FOR URBAN-RAILROAD FACILITIES IMPROVEMENT PROJECTS**

The report references previous studies and activities in the field of urban railroad facilities improvements. It identifies the Federal agencies and specific programs which are available for assistance to local governments in urban railroad facilities improvement projects and in stimulating economic development which might result from such improvements. Eligibility criteria and application methods are summarized. Specific project cities are examined on the basis of on-site studies and telephone and correspondence surveys, and analyzed in terms of the actual and potential funding from the available Federal programs.

Royce, RB

Royce (Richard B), Federal Railroad Administration Final Rpt.  
RR-FRA-1-80, FRA-RFA-80-03, Feb. 1980, 37p

Contract DOT-FR-9146

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-188857, DOTL NTIS

18 316370

**TRANSPORT COSTS BY RAIL [Costos del transporte ferreo]**

The author outlines a methodology for the calculation of railway costs and applies it to current conditions to determine the overall cost of this mode. The data used in the study are those of 1974 which were updated in 1977. Part 1 describes the different cost components, part 2 describes the results of their being applied to a concrete case of railway transport. For the covering abstract see IRRD abstract no 108676. [Spanish]

16th National Congress of Civil Engineering, October 4-8, 1978, Cali, Colombia.

Ramos, LG

Ministerio de Obras Publicas y Transporte Oct. 1978, 39p, 10 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 108684), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain

ORDER FROM: Ministerio de Obras Publicas y Transporte, Oficina de Planeamiento, Cali, Colombia

18 318717

**CURRENT COST OF OPERATING REFRIGERATED TRUCKS FOR HAULING FRESH FRUITS AND VEGETABLES BY MULTI-TRUCK FIRMS**

Current cost per mile for operating refrigerated trucks to haul fresh fruits and vegetables are developed. Costs were originally developed in 1976 using a synthetic cost analysis and were updated to 1979 using indexes of other sources. Cost per mile tended to decrease as trip lengths increased and total annual mileage increased. Cost increased 37 percent between 1976 and July 1979. Fuel prices increased 70 percent while all other items increased 29 percent.

Boles, PP

Economics, Statistics, and Cooperatives Service Staff Rpt. Dec. 1979, 24p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-194251

18 318758

**OWNER-OPERATOR COSTS OF HAULING FRESH FRUITS AND VEGETABLES IN REFRIGERATED TRUCKS**

Cost per mile for owner-operators hauling fresh fruits and vegetables is estimated. Analysis is similar to a 1979 study of multitruck firms hauling fresh fruits and vegetables. Data from eight owner-operators were used as cost elements. Costs per mile were estimated for (1) trips of different lengths and operating conditions and (2) for the number of miles driven each year. Unit costs tended to decrease for longer trips and as annual mileage increased. Driver cost was the most expensive item, and included wages that owner-operators paid themselves, wages for a driver-helper, and trip-related costs such as per diem. Fuel was the second most expensive item, and included fuel for operating the tractor and refrigeration unit.

Boles, PP

Economics, Statistics, and Cooperatives Service ESCS-82, July 1980, 27p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-199557

18 319376

**USE OF A MULTIREGIONAL VARIABLE INPUT-OUTPUT MODEL TO ANALYZE ECONOMIC IMPACTS OF TRANSPORTATION COSTS**

A multiregional variable input-output model is introduced to investigate the impact of a change in transportation costs on regional development and trade flows. Regional Technical coefficients and trade coefficients are endogenous variables to the model and are sensitive to transportation costs as well as other input costs. Each industry is assumed to have a linear logarithm production frontier with a constant return to scale. Profit-maximizing price frontiers are obtained from the dual relation. These prices are expressed in terms of transportation costs, wage rates, land prices, input elasticities, and parameters of technical progress. These prices determine the regional technical coefficients and trade coefficients. The impact of a change in transportation costs on trade structure, regional growth, and inflation is investigated by using 1963 three-region, 10-sector interindustry flow data as a base. As expected, an increase in transportation cost between regions reduces the trade coefficient between the regions and increases the "own" trade coefficient; i.e., the purchases from other regions decrease and the purchases from local markets increase as the costs of transportation increase. An increase in transportation cost hampers regional development, but its sensitivity differs among industries. (Author)

This paper appeared in TRB Research Record No. 747, Economic and Social Aspects of Transportation.

Liew, CK Liew, CJ Gamble, HB *Transportation Research Record* No. 747, 1980, pp 5-12, 4 Tab., 8 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

18 319688

**ECONOMIC VEHICLE REPLACEMENT POLICIES**

The report is intended to set out criteria to be considered when formulating a vehicle replacement policy for transport operators. Such decisions are based on the concept of minimizing average annual cost. The age at which this cost is a minimum is defined as the economic life. The derivation of economic lives can be calculated for either individual vehicles or as a group. Methods of deciding economic lives vary from using an algebraic formula, nomogram charts or computer programs depending on data available. (TRRL)

Evans, S Phillips, G

Local Government Operational Research Unit Monograph Nov. 1977, 21p, 6 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 247858)

ORDER FROM: Local Government Operational Research Unit, 201 Kings Road, Reading, Berks, England

18 319919

**RENT AND REGULATION IN UNIT-TRAIN RATE DETERMINATION**

Railroads and utilities bargain over rates for hauling coal. In the past, the price of alternative fuels has served to limit those rates. Recently, these limits have been raised by regulation-induced shortages in natural gas, cartel-induced price rises for oil, and environmental opposition to nuclear power. This article estimates a model of the rate making process and examines how the process has responded to increased prices of alternative fuels.

Zimmerman, MB (Massachusetts Institute of Technology) *Bell Journal of Economics* Vol. 10 No. 1, 1979, pp 271-281, 2 Tab., 6 Ref.

ORDER FROM: American Telephone and Telegraph Company, 195 Broadway, Room 01-1940, New York, New York, 10007

DOTL JC

18 319973

**USRA MODEL WILL PREDICT YOUR PROFITABILITY**

The United States Railway Association has developed a computerized planning system. Its main characteristics are described. The system is known as the "Operations Cost Model" (OCM).

Roberts, R *Modern Railroads/Rail Transit* Vol. 35 No. 2, Feb. 1980, pp 60-62, 1 Fig.

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

DOTL JC

18 320306

**OPERATING REVENUES AND OPERATING EXPENSES OF CLASS I RAILROADS IN THE UNITED STATES, STATEMENT Q-100, 1920-PRESENT**

Table includes miles of road operated, revenue, expenses, taxes, equipment, net railway operating income, etc. for U.S. and by region and district, for quarter. Switching and terminal companies are not included. Based on two year comparisons.

Hardcopy. Class I Carriers are required to report form RE & I and form CBS (Quarterly condensed balance sheet) to Interstate Commerce Commission.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (306)  
ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, 12th Street & Constitution Avenue, NW, Washington, D.C., 20423

18 320463

**TRANSPORT ECONOMICS (1941-PRESENT) FORMERLY TITLED, MONTHLY COMMENT ON TRANSPORT STATISTICS**

Contains current statistics and certain other material that is not readily available from other sources. The appendix tables show condensed statistics of Class I railroads and are intended to provide current statistics on a continuing basis, and includes net railway operating income, net income, working capital, employees, service hours and compensation.

Hardcopy.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (463)  
ORDER FROM: Interstate Commerce Commission, Bureau of Economics, Washington, D.C., 20423

DOTL JC

18 320730

**INDEXES OF RAILROAD MATERIAL PRICES AND WAGE RATES, CLASS I RAILROAD**

Annual indices of charge-out prices and wage rates, and quarterly indices of spot prices of railroad fuel material and supplies, U.S. and three districts (unit operating costs, unit capital costs). Major data content: Annual indices (1967 equals 100) covering U.S. and eastern, southern and western districts for: A. Fuel B. Other materials and supplies; and Wage rates and composite indexes for: 1)Material prices and wage rates; 2)Wage rates plus payroll taxes, health and welfare benefits and other allowances; and 3)All components combined. Quarterly indices, U.S. and districts for: A.Fuel, B. Forest products, C. Iron and steel products and D.Miscellaneous products 1) Total, excluding fuel and 2) Total, including fuel.

Hardcopy.

126

Association of American Railroads Quarterly No Date, n.p.  
ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (730)  
ORDER FROM: AAR

18 322001

**ESTIMATION OF COST ELASTICITIES FOR LIGHT DENSITY RAILROAD FREIGHT SERVICE**

In this article cost elasticities for light density or "branch" line railroad freight service are estimated using a flexible estimation approach and a multidimensional measure of service output. Based on this analysis, it appears that railroad freight service can be usefully described as consisting of quantity, distance, bulk, and frequency characteristics. In addition, important interregional cost differences were discovered when a market distinction on the basis of differences in land surface form characteristics was adopted.

Hirschey, MJ *Land Economics* Vol. 3 No. 55, Aug. 1979, pp 366-378

ACKNOWLEDGMENT: Journal of Economic Literature  
ORDER FROM: Wisconsin University Press, P.O. Box 1379, Madison, Wisconsin, 53701

DOTL JC

18 322175

**PROBLEMS IN IMPLEMENTING REGULATORY ACCOUNTING AND COSTING SYSTEMS FOR RAILROADS**

The Interstate Commerce Commission recently revised its regulatory accounting system and is in the midst of establishing a new costing system to develop information needed to judge rates for railroad services. GAO believes the Commission must do more to make sure that railroads implement the new accounting system correctly and that the new data is used effectively. GAO makes several recommendations to smooth the conversion process. The Commission is considering making additional changes to its regulatory accounting and costing systems. However, if major new accounting and costing requirements are introduced too soon, the railroad industry could be burdened with complex and difficult reporting requirements which do not necessarily serve Federal regulatory needs.

General Accounting Office FGMSD-80-61, July 1980, 39p, 1 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548

18 322228

**ISSUES IN THE EVALUATION OF METROPOLITAN TRANSPORTATION ALTERNATIVES**

This paper was prepared as part of a study by the Urban Institute to improve the cost-estimation methods and evaluation procedures for the Urban Mass Transportation Administration alternatives analysis process. Several important issues related to evaluation of alternatives are discussed. They include problems and advantages of several analytical evaluation techniques such as cost-benefit analysis, cost-effectiveness analysis, and project scoring. Issues in evaluating user benefits are also discussed. Much of the complexity in the evaluation of alternatives comes from the different interests or groups that must be involved and the differences between the federal and local viewpoints. This paper is not a handbook on evaluation and assumes a basic knowledge of analytical evaluation techniques. (AUTHOR)

Cheslow, MD *Transportation Research Record* No. 751, 1980, pp 1-8, 2 Ref.

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18 322796

**RAILROAD FREIGHT CAR RENTAL RATES-THEIR IMPACT ON RAILROAD MANAGEMENT DECISIONS AS TO INVESTMENTS IN AND UTILIZATION OF THE FREIGHT CAR FLEET**

Since 1902 three different basic rental systems and one incentive-type system have been used for freight cars. This study analyzes these car rental systems and examines their ineffectiveness in maintaining an adequate supply of cars to fill customer needs and their failure to encourage effective utilization of the existing fleet. The conclusions were then used to develop a rental scheme which should achieve these objectives but be simple to administer. The system proposed emphasizes the utility value of the freight car to the using railroad and its customer, rather than cost differentiations which equate entirely to ownership interests. There is also a flexibility to need variable demand conditions.



McConnell, TO  
Georgia University, Athens Dissertatn 1979, 349p, 59 Tab., 11 App.  
ORDER FROM: University Microfilms International, 300 North Zeeb Road,  
Ann Arbor, Michigan, 48106

DOTL HE2123.M22

18 322798

#### ECONOMIC ANALYSIS OF LIGHT DENSITY RAIL LINES

In examining the viability of light-density lines, the author has used the FRA network Model which has appraised data for 3000 such line segments in the U.S. To estimate the amount of excess branch line capacity and potential savings from its abandonment, a simulation mode was employed. Parameters on which the model is based include costs per mile, and revenue share attributed to the branch. Five studies of branch line operation are reviewed with best estimates of each parametric value derived. Sensitivity of results in terms of the parametric values are examined and finally public policy implications of the study are presented.

Harris, RG (California University, Berkeley) *Logistics and Transportation Review* Vol. 16 No. 1, 1980, pp 3-31, 2 Fig., 3 Tab., Refs., 1 App.

ORDER FROM: British Columbia University, Canada, Faculty of Commerce,  
Vancouver V6T 1W5, British Columbia, Canada

DOTL JC

18 325428

#### CAPITAL INVESTMENT: PLAYING THE GAME TO WIN

Although many projects are producing an attractive return on railroads' investments, a recent study made for DOT suggests that not all railroad capital projects are adequately analyzed. Decision-making and profitability are enhanced by improving procedures for computing rate of return, examining procedures to determine what will happen if projects are not funded, and supplementing rate-of-return computations with other analyses.

Lutes, J (Ernst and Whinney); Harman, JE (Department of Transportation) *Railway Age* Vol. 181 No. 24, Dec. 1980, p 25, 1 Phot.

ORDER FROM: ESL

DOTL JC

18 325431

#### ICC RELEASES COMPUTER PROGRAMS FOR NEW RAIL COST ACCOUNTING SYSTEM

URCS, developed by the ICC Bureau of Accounts and its Section of Systems Development, replaces the Rail Form A to determine the cost of providing freight service for rate making purposes. URCS programs, written in Fortran 10, are run on a DEC-10 computer but can be programmed for other types. URCS Phase I encompasses statistical regression and analysis; Phase II contains worktables based on 1978 data from all Class I railroads. The required rail data base for all reporting Class I railroads is also available.

Available from Section of Systems Development, Office of Managing Director, Interstate Commerce Commission, Washington, DC 20423.

Interstate Commerce Commission No Date, n.p.

ORDER FROM: Interstate Commerce Commission, Bureau of Accounts,  
Washington, D.C., 20423

18 325469

#### COST-SERVICE MODELING: THEORY AND PRACTICE

Recent developments in transportation have increased the need for accurate microeconomic modeling. If it reflects situation-specific data, microeconomic modeling can be a valuable tool for shippers, carriers, and public policymakers. Reebie Associates has developed a unique cost-service modeling technique over the past 10 years. This paper outlines its theoretical structure and a recent application. The model described simulates carrier and shipper economics. The trade-off between cost and service is essential to both. A brief description, at the theoretical level, is given of the relationship between production costs and the service level for the carrier and that between transportation costs and distribution costs for the shipper. A graphic presentation is developed to describe them and their interrelationship. The theoretical construct is then employed to describe a recent market research project (conducted for the New York State Department of Transportation) that examined the feasibility of a new intermodal service. Three elements of that study- cost and service modeling, market segmentation, and shipper modal preference-are described briefly and related to the preceding theoretical construct. The paper ends with suggestions for further research. (Author)

This paper appeared in Transportation Research Record No. 758, Surface

Freight: Rail, Truck, and Intermodal.

Robertson, AC *Transportation Research Record* No. 758, 1980, pp 75-81, 8 Fig., 3 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

18 325470

#### MEASURING INTERMODAL PROFITABILITY

The profitability of intermodal operations provided by the rail industry and commonly known as trailer-on-flatcar (TOFC), or piggyback, service has been questioned in recent years. Although TOFC loadings have increased, the growth has not been as rapid as many believe possible; the industry's hesitancy to make the necessary investment and the reluctance of other modes to take advantage of rail line haul are indications of this situation. Although railroad-costing methodology has improved in the past decade, difficulties still exist in ascertaining profitability of any one segment of traffic. The difficulty of allocating costs prevents costing officials from accurately determining intermodal costs and hence profitability. It is this situation that confronts management with investment decisions and present the Federal Railroad Administration (FRA) with problems in the promotion of intermodal operations in the rail industry. Congress provided funding for the FRA to partially offset operating losses in intermodal demonstrations under certain criteria; the most important of these are potentially profitable operations. In view of the problem with railroad-costing methodology, how should the profitability be measured? The FRA is funding research in two phases to develop an Intermodal Management Information System (IMIS). The first phase, an overview of rail information systems and a state-of-the-art survey, confirmed the need for an IMIS and identified three modules that could be readily transferred in various stages of development and testing are an Intermodal Management Equipment Control System (IMECS), which generates adequate records for detention billing and control of trailers, and a Repetitive Waybilling and Rating System (RWRS), which electronically maintains a comprehensive audit trail of waybill activity. Both these systems (and other sources) provide an automated collection of intermodal records to ascertain profitability for the rail carrier. (Author)

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck and Intermodal.

Brooks, WR *Transportation Research Record* No. 758, 1980, pp 81-88, 1 Fig., 1 Tab., 2 Ref.

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18 325753

#### BIBLIOGRAPHY ON THE ECONOMICS OF TRANSPORT.

##### VOLUME 8 [Bibliographie d'economie des transports-tome VIII]

This volume is the 7th supplement to the bibliography on the economics of transport published in 1971. It contains approximately 900 references to French and English publications. Part 1 classifies the documents as a function of a detailed plan specific to each main sector considered (economics and transport modes). Access to data is possible through the classification plan, keyword indexing, geographical index and authors' index. Part 2 presents the summaries of 80 documents (lectures, studies, reports, theses) mentioned in Part 1. [French]

Clerc, N

Centre de Documentation Sciences Humaines Monograph 1979, 160p, Refs.

ACKNOWLEDGMENT: TRRL (IRRD 105933), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Centre de Documentation Sciences Humaines, Boulevard Raspail 54, Paris, France

18 325913

#### METHODS TO REDUCE CAPITAL INVESTMENTS ON RAILWAY CONSTRUCTION AND MODERNISATION (A STAGE-BY-STAGE APPROACH)

Experience has shown that newly opened railway lines are characterised by considerable traffic growth during the first 15 to 30 years. However, if the initial volume of traffic is overestimated the railway will have a surplus capacity during its early life and a considerable portion of the initial capital investment will not be utilised effectively. The aim of the article is to analyze a method of increasing line capacity by stages as traffic develops so that an optimum return on invested capital is constantly obtained.

See also Vol. 11 No. 11, November 1980 issue.  
Kondratchenko, AP Turbin, JV *Rail International* Vol. 11 No. 10, Oct. 1980, pp 629-644, 2 Tab., 12 Phot.

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

DOTL JC

**18 326028****RAIL SYSTEM INVESTMENT ANALYSIS: SAMPLE EVALUATION OF A LOCOMOTIVE REBUILDING PROJECT**

The report is a case study showing how a railroad might calculate an internal rate of return for an investment project involving the replacement or rebuilding of worn-out equipment. Although the technical approach and format of the analysis conform to the requirement of Federal Railroad Administration regulations governing the Title V financial assistance program, the approach is applicable to any asset replacement analysis.

See also PB80-214943. Prepared in cooperation with Banks (R. L.) and Associates, Inc., Washington, DC.

Ernst and Ernst, Asst Secretary for Policy & International Affairs Final Rpt. DOT-P-10-79-02, Jan. 1979, 49p

Contract DOT-OS-60097

ACKNOWLEDGMENT: NTIS  
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PB80-214935

**18 326029****RAIL SYSTEM INVESTMENT ANALYSIS: MANUAL FOR DETERMINING RETURN FROM THE INDIVIDUAL CORPORATE PERSPECTIVE**

The manual is addressed to railroad employees responsible for conducting financial analyses of projects proposed for inclusion in a railroad's capital budget. Parts of the manual, such as the executive introduction, will also be of interest to the railroad officials who review such analyses and make decisions based on them. The recommended procedures take the best features of the approaches currently being used on 13 railroads cooperating with the study. The recommended procedures have been carefully checked for theoretical soundness, and have been tested on several dozen actual railroad investments. The recommended procedures are consistent with the Federal Railroad Administration's regulations governing rate of return computations in applications for federal aid under Title V of the Rail Revitalization and Regulatory Act of 1976.

See also PB80-214935. Prepared in cooperation with Banks (R. L.) and Associates, Inc., Washington, DC.

Ernst and Whinney, Asst Secretary for Policy & International Affairs Final Rpt. DOT-P-10-79-27, Oct. 1979, 189p

Contract DOT-OS-60097

ACKNOWLEDGMENT: NTIS  
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PB80-214943

**18 326044****RAIL SYSTEM INVESTMENT ANALYSIS: SAMPLE EVALUATION OF A TRACK REHABILITATION PROJECT FROM THE NATIONAL ECONOMIC PERSPECTIVE**

This report is a hypothetical case study of a railroad track rehabilitation from the perspective of the national economy. The case is divided into six parts. Part I is an executive summary. Part II presents a description of the project--the rehabilitation of 110 miles of mainline track on the XLR Railroad. The third part is a detailed description of the base case, the most favorable alternative action the XLR railroad could take without government financial assistance. Part IV presents the traffic forecasts for both the base and project cases. Part V identifies the project's major benefits and shows how the corresponding cash flows were calculated. A discussion of the principal areas of uncertainty is also included. Part VI presents an internal rate of return.

Prepared in cooperation with Banks (R. L.) and Associates, Inc., Washington, DC.

Ernst and Whinney, Asst Secretary for Policy & International Affairs Final Rpt. DOT-P-10-79-26, Jan. 1980, 96p

Contract DOT-OS-60097

ACKNOWLEDGMENT: NTIS

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PB80-218274

**18 326047****RETURN FROM THE NATIONAL ECONOMIC PERSPECTIVE**

The manual explains how to do rate of return computations from the national economy point of view. It assumes the reader is already familiar with the rate of return computation as it is commonly used for evaluating capital investments from the perspective of the private railroad. The manual deals with the differences between rate of return analyses done from the investing railroad's point of view and those done from the national economy point of view. It identifies the costs and benefits most often associated with railroad projects and suggests how dollar values from those impacts can be estimated.

Prepared in cooperation with R. L. Banks and Associates, Inc., Washington, DC.

Ernst and Whinney, Asst Secretary for Policy & International Affairs Final Rpt. DOT-P-10-80-03, Jan. 1980, 74p

Contract DOT-OS-60097

ACKNOWLEDGMENT: NTIS  
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PB80-219017

**18 326050****RAIL SYSTEM INVESTMENT ANALYSIS: ANALYSIS OF INVESTMENT PROJECTS FROM THE NATIONAL ECONOMIC PERSPECTIVE**

The study examines the impact of railroad investment projects from the national economic perspective. Evaluation results are presented for 27 sample projects which were taken from nine applications for Title V assistance submitted by railroads to the Federal Railroad Administration. Among the issues addressed by this report are; project evaluation techniques (particularly the internal rate of return); the national economic impacts characteristic of railroad investments; the relationship between rate of return and other project attributes; and the effect of institutional factors on railroad investment decisions.

Prepared in cooperation with R. L. Banks and Associates, Inc., Washington, DC.

Ernst and Ernst, Asst Secretary for Policy & International Affairs Final Rpt. DOT-PC-10-80-02, Jan. 1980, 137p

Contract DOT-OST-60-097

ACKNOWLEDGMENT: NTIS  
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PB80-219066

**18 326271****AN EXAMINATION OF THE TRANSIT FUNDING PROCESS AT THE LOCAL LEVEL**

The study examines the transit funding process at the local level during the period of public ownership. In particular, the study focuses on what the recent injection of public funds has bought and on those features of the local decision making process which have led to the particular uses chosen for the funds. The study is organized around five types of decisions which encompass the key choices made in most localities since the time of public takeover. These are: (1) the decision to assume public operation and subsidization of the transit system; (2) decisions about the uses of federal capital assistance grants; (3) decisions about the use of formula funds from higher levels of government for capital and operating assistance; (4) decisions about the appropriate response to growing demands for attention to the special transportation needs of the elderly and handicapped; and (5) decisions about the appropriate response to the growing fiscal austerity of the late 1970s. The study findings are based on case studies in nine metropolitan areas. The study cities were selected to include a wide range of sizes, population densities and growth rates, mode splits for the journey to work, durations of transit deficits, and local government expenditures per capita.

Womack, JP Altshuler, AA  
Massachusetts Institute of Technology, Urban Mass Transportation Administration, (UMTA-MA-11-0030) Final Rpt. UMTA-MA-11-0030-80-1, May 1979, 70p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-226954

18 326409

**FINANCIAL ASPECTS OF COAL TRANSPORTATION BY RAIL**

The report evaluates both the financial capability of this country's railroads to invest in incremental coal-carrying capacity and the rates of return allowed on these incremental investments. Given coal movements scenarios are utilized to estimate incremental coal movements by railroad and investment requirements to handle these movements are determined. The financial resources of the railroads are analyzed and capital acquisition strategies are assessed and selected. Railroads are segregated by financial status and the various financial markets are examined to determine cost and availability of capital. A description of various debt and equity issues is included. Various rate-making methodologies are examined with regard to their treatment of return on investment. Utilizing the costs of capital determined above and the return on capital costs allowed by these rate methodologies, the effects on the financial viability of the railroads is analyzed.

Coleman, RC Knoblauch, K

Input Output Computer Services, Incorporated, Asst Secretary for Policy &amp; International Affairs Final Rpt. DOT-P-10-80-24, Sept. 1979, 125p

Contract DOT-OS-80083

ACKNOWLEDGMENT: NTIS

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PB81-110868

18 329524

**WHY LEASING OR RENTING RAILCARS MAKES SENSE**

The article gives advantages, types of leasing arrangements, and features of maintenance programs which are available.

Guccione, E *Coal Mining and Processing* Vol. 17 No. 5, May 1980, pp 56-58

ACKNOWLEDGMENT: EI

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18 329940

**ECONOMIC ANALYSIS OF INTERCITY FREIGHT TRANSPORTATION**

Economic analysis of intercity freight transport is accompanied by assessment of many of the empirical studies of intercity freight markets in terms of demand, supply, costs, pricing and regulation. Part I outlines the theory of the derived demand for intercity freight transport in its several forms and examines the attempts to measure the level and elasticity of demand at various levels of aggregation. It also investigates efficient pricing criteria with respect to the theory and measurement of transport costs by mode, and reviews what is known analytically and empirically about the economic effects of intercity transport regulation. Part I attempts to analyze the criteria relevant to a more efficient use of existing transport facilities. Part II takes up the problem of expanding transportation capacity using efficiency criteria.

Wilson, GW

Indiana University Press 1980, 338p, Figs., Tabs., 1 App.

ORDER FROM: Indiana University Press, Bloomington, Indiana, 47401

19 322980

**THE RAILROAD AND THE SPACE PROGRAM--AN  
EXPLORATION IN HISTORICAL ANALOGY**

This volume, one of a series, results from an inquiry by the American Academy of Arts and Sciences into the impact of the national space efforts on American society and was funded by NASA. The editors have focused their attention on historical analogy as a device to assist in forecasting or projecting the impact of the space program. The coming of the railroad was chosen as most comparable to America's space program. In the 19th century the railroad was the "tremendous and far-reaching engine of social revolution" which left its mark on a whole range of areas--economic, sociological, political and intellectual. Analyzed is the relationship between the railroad and contemporary technology, the effect of the railroad on growth of the U.S. economy, the railroad's part in creating modern industrial administration, and its effect on people's ideas of the world in which they lived.

Mazlish, B

Massachusetts Institute of Technology Press 1965, 223p, Tabs.

ORDER FROM: Massachusetts Institute of Technology Press, 28 Carlton  
Street, Cambridge, Massachusetts, 02142



20 314294

## GREAT LAKES TRAFFIC AND COMPETITION STUDY. VOLUME 1- EXECUTIVE REPORT

The overall program is designed to improve the capabilities and market share performance of the Great Lakes and St. Lawrence Seaway systems. The study focuses on the traditional 19-State Great Lakes region, stratifying the States into high-, medium-, and split-penetration areas. To meet the primary objective, the study also creates domestic and international commodity flow data bases, identifies shipper/consignee routing criteria, and examines the impact of least-cost competition and market/institutional factors (stimuli) on market share.

Also available in set of 3 reports PC E12, PB80-181597.

Walker, RL

Maritime Administration Final Rpt. MA-PORT-970-80068, Aug. 1979, 19p

ACKNOWLEDGMENT: NTIS

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PB80-181605

20 314295

## GREAT LAKES TRAFFIC AND COMPETITION STUDY. VOLUME II: FINAL REPORT

The primary objective of the Great Lakes Traffic and Competition Study is to recommend a two-part program of (1) marketing initiatives and (2) institutional changes that can be employed by the Great Lakes maritime community in improving the market share performance of the Great Lakes and St. Lawrence Seaway Systems. In meeting the primary objective of a two-part action program, a number of secondary objectives are addressed. These include the definition of a Great Lakes hinterland, the creation of domestic and international commodity flow data bases, the identification of shipper/consignee routing criteria, and the impact of least-cost competition and market/institutional factors on market share.

Also available in set of 3 reports PC E12, PB80-181597.

Leeper, J

Simat, Helliesen and Eichner, Incorporated, Maritime Administration  
MA-PORT-970-80069, Aug. 1979, 239p

ACKNOWLEDGMENT: NTIS

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PB80-181613

20 314296

## GREAT LAKES TRAFFIC AND COMPETITION STUDY. VOLUME III: APPENDICES

Volume of Appendices A-J clarify and supplement the basic analysis. These appendices range from summary analyses to statistical tables and charts.

Also available in set of 3 reports PC E12, PB80-181597.

Leeper, J

Simat, Helliesen and Eichner, Incorporated, Maritime Administration  
Final Rpt. MA-PORT-970-80070, Aug. 1979, 275p

ACKNOWLEDGMENT: NTIS

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## STRUCTURE OF THE NATION'S FUTURE FREIGHT SYSTEM

The principal determinant of the modal makeup of the U.S. transportation system is the outcome of the current regulatory reform process going on in Washington. The next 10 years will probably see major changes in the regulatory scheme. The outcome will greatly condition the type of transport system that we will eventually have. It is difficult to say whether the system will be dramatically different in physical appearances. Chances are it will not. Statistically, however, it is likely to be quite different. It almost certainly will have more truck and less rail, but the essential questions relate to whether the components are healthy, not to their overall magnitude. The second big unknown is the impact of fuel price and availability. The best of all possible worlds would be a steady rise in the price of petroleum until such time as new technological developments provide us with new energy sources, or new engines, or both. The range of possible outcomes is huge. It could prove to be a very exciting period for technology developers. If fuel prices rise to very high levels, it could even force a generalized reorganization of the economy. This could have major consequences for continued economic growth and would substantially alter the economic patterns of trade and

development as well as life-styles. The more probable occurrence, however, is for a series of shorter-term fuel crises. Methods for coping with these without damaging our economy must continue to be sought. (Author)

This paper appeared in Transportation Research Board Special Report No. 189: State Transportation Issues and Actions.

Roberts, PO (Massachusetts Institute of Technology) *Transportation Research Board Special Report* No. 189, 1980, pp 58-67, 4 Fig., 2 Ref.

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20 318264

## EVALUATION OF EFFECTS OF ALTERNATIVE WESTERN FREIGHT RATES FOR COAL. ANALYSIS REPORT AR/IA/80-04

This report presents an analysis of the impact of coal rail transportation costs upon coal production, distribution, and consumption based on runs of the Midterm Energy Market Model (MEMM) using rate structures defined by the Interstate Commerce Commission. Overall levels of coal production in the United States change significantly in response to changes in western freight rates for coal. In addition, significant regional impacts can be expected in the coal producing areas of Northern and Central Appalachia, the Midwest, and the Western Northern Great Plains. Any increase or decrease in western freight rates will have an opposite effect on coal movements crossing the Mississippi River. In general, coal shipments from western producing areas to eastern coal markets are more sensitive to freight rate changes than vice versa. The amount of energy consumed in the United States would be negligibly affected by a change in western freight rates. However, electric utilities would substitute between coal and oil. In general, any freight rate increase would cause the electric utility industry to replace sub-bituminous fired generating capacity with bituminous units. However, in the West and New York/New Jersey regions, oil would be substituted in place of coal by operating existing distillate and residual units more intensively. Electricity prices are only slightly affected by western coal freight rates for coal. A quadrupling in western rail rates would cause average electricity prices to increase 6 percent. (ERA citation 05:013020)

Chamberlain, I

Department of Energy Jan. 1980, 26p

ACKNOWLEDGMENT: NTIS

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DOE/EIA-0184/25

20 318277

## COAL TECHNOLOGIES MARKET ANALYSIS. FINAL REPORT

This report presents an analysis directed to the greater use of coal to displace foreign petroleum. It examines the US energy system in the year 1990 under the assumption of Federal laws and policies as existed in the last half of 1979-in particular, the National Energy Act of 1978 and the new energy initiatives announced by the President in July 1979. Energy production, flow, and use patterns for the year 1978 are developed. Starting with this historical base, the constraints and initiatives identified by the National Energy Act and the President are used to develop a plan for the decade of the 90's that is technically feasible and economically viable. The end-use energy demands for the year 1990 are matched with estimated available domestic energy sources including coal, natural gas, petroleum, nuclear, hydro and other solar. The required scale of coal technology to supply future needs is established. Distillate fuels (transportation fuels) are identified as the critical barrier to reducing foreign oil dependence. Synthetic fuels from coal-with the emphasis on transportation fuels- offer the only solution available to eliminate this barrier in the remainder of this century. Although the necessary synfuels plants will require a capital investment of some \$60 billion during the next ten years, this investment is 25% of that which is also needed in the same period for new coal-fired electric power plants. The implications of moving toward a coal-based economy, a discussion of present technology trends, and an action plan for eliminating the critical barrier to reducing petroleum imports are presented. (ERA citation 05:020038)

Engineering Societies Commission on Energy, Inc., Department of Energy  
Jan. 1980, 59p

Contract EF-77-C-01-2468-016

ACKNOWLEDGMENT: NTIS

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FE-2468-64

20 318283

**ROCKY1: AN ENERGY-ENVIRONMENT MODEL OF COAL AND ELECTRICITY SUPPLY**

This report describes a linear programming model of coal supply and electricity generation called ROCKY1. ROCKY1 is a national model built up from 57 coal demand (electricity supply) regions, 39 electricity demand regions, and 30 coal supply regions. The model satisfies a specified demand for electricity in each region by simulating coal production and transportation, electricity generation, and electricity transmission to minimize total costs subject to physical and environmental constraints. The model is appropriate for a wide range of energy policy analyses. It can aid in the examination of the effects of national legislation governing air-quality standards and of restrictions on coal burning imposed by individual states. The method of incorporating restrictions on ambient concentrations of sulfur dioxide is unique to ROCKY1 and provides a basis for examination of the effects of coal conversion on western air quality. (ERA citation 05:014719)

Bivins, RL Kolstad, CD Loose, VW Pendley, RE Stein, ML  
Los Alamos Scientific Laboratory, Department of Energy Feb. 1980, 25p  
Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS  
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LA-7988

20 318300

**FORECAST OF LONG TERM COAL SUPPLY AND MINING CONDITIONS: MODEL DOCUMENTATION AND RESULTS**

A coal industry model was developed to support the Jet Propulsion Laboratory in its investigation of advanced underground coal extraction systems. The model documentation includes the programming for the coal mining cost models and an accompanying users' manual, and a guide to reading model output. The methodology used in assembling the transportation, demand, and coal reserve components of the model are also described. Results presented for 1986 and 2000, include projections of coal production patterns and marginal prices, differentiated by coal sulfur content.

Sponsored by NASA and DOE Prepared for JPL.

Energy and Environmental Analysis, Incorporated, National Aeronautics and Space Administration Final Rpt. NASA-CR-163141, JPL-9950-310, Mar. 1980, 240p

Contract JPL-955552

ACKNOWLEDGMENT: NTIS  
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N80-24728/1

20 318379

**COLORADO COAL RESERVES DEPLETION DATA AND COAL MINE SUMMARIES. FINAL REPORT**

Coal mining began in Colorado in the early 1860's. Since then, the 1667 mines located by the authors have produced a total of 598,824,876 short tons of coal to January 1, 1977. This activity has depleted the reserve base of Colorado by 1,160,752,484 short tons. Most of the coal produced to date has been mined from beds ranging from 4-10 ft in thickness. Using original reserve base estimates calculated by the US Department of Energy (Matson, 1979), 6.67 percent of the State's demonstrated coal reserve base has been produced or lost in the process of mining. This leaves 93.33 percent of the original reserve base intact. Estimates of the remaining demonstrated coal reserve base for each coal-bearing region are given. During the two-year period, 1977-1978, the main producing region, the Green River, produced 15,405,488 short tons, or 58.62 percent of total two-year Statewide production of 26,279,491 tons. This high figure is the result of large surface mining operations in the area. Coal has been produced from all of the coal-bearing regions in Colorado. This report is an attempt to determine how much coal has been mined or otherwise rendered unavailable to mining and from what coal zones this production has been obtained. The data presented are preliminary in nature; however, this report does represent a concise summary of certain aspects of the coal mining history of Colorado. The authors hope that this project will result in more efficient future development and production of coal in this State. (ERA citation 05:014730)

Boreck, DL Murray, DK  
Colorado Geological Survey, Department of Energy May 1979, 80p  
Contract EI-78-F-01-6229-MOO

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

USGS-OFR-79-1

20 319696

**DEVELOPMENTS IN FREIGHT TRANSPORT**

Probable developments in freight transport in Great Britain over the next 20 years were investigated in a series of interviews with transport operators and users. The report of the study presents an analysis of past trends in freight transport by the four main modes (road, rail, water and pipeline) and discusses likely future technical and operational developments in freight transport modes and distribution management. The future demand for freight transport is analysed in terms of the effects of economic factors, industrial structure and location, transport policies, non-transport policies and energy costs. The study reaches a number of broad qualitative conclusions about the economic and environmental impacts of these changes in the period 1980-2000.(A) (TRRL)

Corcoran, PJ Hitchcock, AJ McMahon, CM  
Transport and Road Research Laboratory Monograph TRRL SR 580, 1980, 52p, 4 Fig., 8 Tab., 18 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 248497)  
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**FORECAST TAPE**

For the years 1972, 1975, 1980, 1990, the tapes contain origin BEA, origin node, destination BEA, destination node, tons shipped BEA to BEA, and tons shipped node to node.

Available on 9 Track 800 BPI, ASCII. Contact Transportation Systems Center for approval.

Federal Railroad Administration No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (277)  
ORDER FROM: TSC

20 320801

**BEA-TO-BEA BULK COMMODITY FLOW TAPE**

The tapes project flows of 19 commodity groups between 171 BEA economic areas by 6 modes from a base year (1972) to 1975, 1980, and 1990. The projections are based on OBERS Series E projections of regional economic activity. The interregional flows of commodities are divided into two major groups: Bulk, and processed/manufactured. The bulk commodity grouping accounts for 80% of the intercity tonnage carried by rail, water, and pipeline. The base year bulk commodity flow data base was developed under contract by Jack Faucett Associates. BEA-to-BEA commodity flows by mode have been extracted from a variety of sources.

Available as 2 tapes, 9 track, 800 BPI, ASCII. Projections are based on OBERS Series E projections of regional economic activity.

Input-Output Computer Services, Incorporated One-Time 1972, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (801)  
ORDER FROM: Input-Output Computer Services, Incorporated, 400-1 Totten Pond Road, Waltham, Massachusetts, 02154

20 320802

**BEA-TO-BEA MANUFACTURED COMMODITY FLOW TAPE**

The tapes project flows of 19 commodity groups between 171 BEA economic areas by six modes from a base year (1972) to 1975, 1980, and 1990. The projections are based on OBERS Series E projections of regional economic activity. The interregional flows of commodities are divided into two major groupings: Bulk and processed/manufactured. The data for commodity shipments of processed and manufactured commodities are extracted directly from the 1972 census commodity transportation survey.

Available as 5 tapes, 9 track, 800 BPI, ASCII or BCD. Data extracted from 1972 Census-Commodity Transportation Survey.

Input-Output Computer Services, Incorporated One-Time 1972, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (802)  
ORDER FROM: Input-Output Computer Services, Incorporated, 400-1 Totten Pond Road, Waltham, Massachusetts, 02154

20 322000

**FUTURE TRANSPORTATION SYSTEMS OF THE GREAT LAKES REGION: ENERGY AND ECONOMICS. VOLUME 1. EXECUTIVE SUMMARY. FINAL REPORT**

A comprehensive network model which could predict the modal share competitive impact of various changes in cost and physical facilities was built. Reports were commissioned from experts in the fields of rail, waterborne, truck, pipeline transport, and an essay on Canadian transportation systems. The essays appear in Volume II. The details of the model appear in Volume III; procedure listings appear in Volume IV; and the final Volume V contains supplemental reports. Five varieties of data or analytical procedures contained in the model are: the interregional flows by commodity; the networks, links, and routes over which physical goods move; data defining the characteristics of the networks over which the goods move; analytical models which translate the characteristics into costs, rates, and other attributes which are transmitted to, or are perceived by, transportation decision makers; and analytical models simulating the joint routing decisions of owners-of-goods and transporters. Some details of the model are presented.

Bushnell, RC  
Wayne State University Oct. 1979, 40p  
Contract EY-76-S-02-4136

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

COO-4136-1(Vol. 1)

20 322801

**A TOTALLY BLEAK PICTURE? LOOK AGAIN**

Despite the effects of recession and some current downturn in forest products traffic, railroads are generally optimistic about the long-term prospects. The outlook for Southern Pacific, Burlington Northern, Family Lines, Southern and other railroads is examined, along with the railroads' individual marketing efforts. Special equipment has been developed to handle logs, woodchips and finished lumber by rail.

Welty, G *Railway Age* Vol. 181 No. 18, Sept. 1980, pp 22-27, 10 Phot.  
ORDER FROM: ESL

DOTL JC

20 322906

**PIGGYBACK: THE COMPETITIVE PRESSURES MOUNT**

Railroad intermodal services, hit simultaneously by a recessionary downturn in traffic and motor carrier deregulation with the potential for traffic diversion, are being studied closely by railroad marketing organizations. While the conclusion is that long-term prospects are positive, some railroads' intermodal traffic has shown no downturn and others are unable to determine just what effect truck deregulation has had. There is great emphasis on dependability and backhauls as marketing strategies. Railroads are confronted with problems in handling today's longer trailers. Supplemental articles discuss truck deregulation and the role for piggyback as seen by shipper agents and associations.

Malone, F *Railway Age* Vol. 181 No. 20, Oct. 1980, p 24, 3 Phot.  
ORDER FROM: ESL

DOTL JC

20 322946

**TRANSPORTATION OF POSTFISSION RADIOACTIVE WASTES FROM THE COMMERCIAL LWR FUEL CYCLE**

Requirements for transportation of postfission radioactive wastes from the commercial LWR fuel cycle were studied. Only radioactive wastes that would require transport to federal facilities for interim storage or final disposal were considered. These wastes included spent fuel, solidified high-level waste, fuel residues and non-high-level TRU waste. Transportation requirements were determined and transport facilities described; packaging and shipping costs were estimated; and the potential environmental impacts of transportation and of postulated accidents were evaluated. Projections are given for the number one cost of waste shipments for the once-through fuel cycle and for a uranium plus plutonium recycle option. The projections are based on an assumed nuclear generating capacity of 400 GWe in the year 2000. On a cost per kg of heavy metal basis, truck cask shipments appear to cost about the same as rail cask shipments. However, shipping cost estimates do not take into account the large increase in cask handling capacity required if all shipments were by truck. It is therefore

assumed that cask shipments will be by rail. Under normal transport conditions, no radioactive materials will be released from shipping containers to the atmosphere, ground or water. Direct radiation doses calculated for members of the general population from passing rail or truck shipments of radioactive wastes are insignificant when compared to doses from natural background radiation. In the absence of accident data involving material releases, a series of minor, moderate and severe accident scenarios for radioactive shipments were postulated. Expected frequencies for these accidents were calculated on the basis of accident statistics and assumed total shipment miles; material releases were postulated for each accident scenario; and radiation doses from these postulated releases were calculated.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(Vol. 2).

Murphy, ES Clark, LL Napier, BA  
Battelle Memorial Institute/Pacific Northwest Labs 1978, pp 939-945

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Battelle Memorial Institute/Pacific Northwest Labs, Battelle Boulevard, P.O. Box 999, Richland, Washington, 99352

20 322948

**WORLDWIDE SPENT FUEL TRANSPORTATION LOGISTICS**

This paper presents an overview of the worldwide transportation requirements for spent fuel. Included are estimates of numbers and types of shipments by mode and cask type for 1985 and the year 2000. In addition, projected capital and transportation costs are presented. For the year 1977 and prior years inclusive, there is a cumulative worldwide requirement for approximately 300 MTU of spent fuel storage at away-from-reactor (AFR) facilities. The cumulative requirements for years through 1985 are projected to be nearly 10,000 MTU, and for the years through 2000 the requirements are conservatively expected to exceed 60,000 MTU. These AFR requirements may be related directly to spent fuel transportation requirements. In total nearly 77,000 total cask shipments of spent fuel will be required between 1977 and 2000. These shipments will include truck, rail, and intermodal moves with many ocean and coastal water shipments. A limited number of shipments by air may also occur. The US fraction of these is expected to include 39,000 truck shipments and 14,000 rail shipments. European shipments to regional facilities are expected to be primarily by rail or water mode and are projected to account for 16,000 moves. Pacific basin shipments will account for 4500 moves. The remaining are from other regions. Over 400 casks will be needed to meet the transportation demands. Capital investment is expected to reach \$800,000,000 in 1977 dollars. Cumulative transport costs will be a staggering \$4.4 billion dollars.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(Vol. 2).

Best, RE Garrison, RF  
Nuclear Assurance Corporation 1978, pp 683-692

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Nuclear Assurance Corporation, 24 Executive Park Drive, Atlanta, Georgia, 30329

20 322976

**NATIONAL ENERGY TRANSPORTATION STUDY**

This study focuses on changing transport patterns caused by the expected shift from oil to coal, assessing the ability of the Nation's transportation systems to carry future volumes of coal, petroleum, natural gas and nuclear materials. Trends in energy commodity transportation are predicted. Areas are identified where capacity problems might require expanded facilities. Also assessed are possible financial, social, safety and environmental constraints on the capability of the system to meet identified needs. Focus is on 1985 and 1990 with few problems anticipated by 1985 and none that would seriously impede energy transportation. By 1990 without significant investment there could be rail-line and inland-waterway constraints on coal volume. New sources of crude oil and petroleum products can change distribution patterns but do not appear to require major systemwide investment in pipelines. A pipeline for Alaska natural gas could be the sole exception to the finding that there are no significant technical, regulatory or financial barriers for this mode. Movements of nuclear materials will not be constrained by physical limitations but safety and other regulatory controls could affect movement of these products.

Asst Secretary for Policy & International Affairs, Department of Energy  
July 1980, 285p, Figs., Tabs., 8 App.

ORDER FROM: DOT

20 322977

**STATUS REPORT ON CANADIAN COAL MINING**

How well is the Canadian coal industry able to expand in the tough competition with other fuels in Canada and with other suppliers in the international, metallurgical and thermal coal trade? Coal production as a whole decreased between 1950 and 1960 and, although there has been a tripling of production since then, underground production continued to decrease until 1975. This trend has been reversed to a certain extent as a result of the modernization of mines in Cape Breton, but in 1978 over 85% of coal production came from surface mining. Against this background, the paper reviews current Canadian mining operations. Conclusions are then drawn regarding some of the longer-term mining applications in relation to the latest coal demand forecast.

Jamieson, ED (Department of Energy, Mines and Resources, Canada)  
*CIM Bulletin* Vol. 73 No. 816, Apr. 1980, pp 98-103

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 322982

**ALBERTA IS LEADING COAL PRODUCER: TREND IS TO MORE THERMAL MATERIAL**

Mines in Alberta produced more than half the total output of raw coal in Canada during 1979. Preliminary figures show that the recent trend to increasing thermal coal production has accelerated, while metallurgical coal output has fallen.

*Coal Miner* Vol. 5 No. 1, Mar. 1980, pp 14-16

ACKNOWLEDGMENT: EI  
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20 323363

**FREIGHT TRANSPORT FORECASTS FOR 1990, THE PRETRAM MODEL [Previsions de transports de marchandises a l'horizon 1990, modele pretram]**

This macro-economic model for the prediction of freight transport is based on the links between the main economic sectors and their reflective transport flows. It enabled modal split (railway, road, waterways, pipelines) to be determined. The 1962-1974 data were used to forecast freight transport for the period 1982-1990. [French]

Boulle-Barbieux, C Maruani, L  
SAE Aug. 1978, pp 17-27, 18 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 105779), Central Laboratory of Bridges & Highways, France, Institute of Transport Research  
ORDER FROM: SAE, Rue Brillat Savarin, 55-57, Paris, France

20 324421

**ELASTICITY OF DEMAND FOR RAIL FREIGHT**

The study described arrives at an empirical determination of the elasticity of demand for rail freight for a railroad firm. Theoretical approach to the problem and data are discussed.

Lackman, CL (Rutgers University, New Brunswick) *Transportation Planning and Technology* Vol. 6 No. 1, 1980, pp 1-7, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

20 324487

**THE IMPACT OF U.S. RAILROAD ABANDONMENT ON DOMESTIC MINERAL INDUSTRIES**

This Bureau of Mines study is intended to identify and evaluate potential effects of impending large-scale U.S. rail line closings (abandonment) on domestic nonfuel mineral industries. This is the first nationwide study of rail abandonment impacts focused on non-fuel minerals. The analysis presented is based principally on a survey of 200 rail freight records and on statistical tests that correlated 2,000 points in the Bureau's Mineral Industry Location System (MILS) with 700 prospective abandonments throughout the United States. The conclusions derived from the analysis can be useful in evaluating proposed national rail abandonment policy and legislation regarding nonfuel mineral shipping. Among these conclusions are the following: (1) Certain mineral materials (especially fertilizers) are likely to account for a large percentage of the rail traffic affected by abandonment in the next few years, but the total tonnage involved will be small; (2) abandonment will adversely

affect some mineral shippers, particularly local short haulers; and (3) abandonment could significantly reduce the opportunity to develop new resource or reopen defunct mining facilities. Despite these problems, however, the data examined in this study do not indicate that current abandonment trends will cause widespread disruption of domestic nonfuel mineral shipping.

Balazik, RF  
Bureau of Mines 1980, 18p, 1 Fig.

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20 324494

**EAST COAST PORTS AND THE BOOM IN EXPORT STEAM COAL**

Eastern railroads can handle the export coal growth projected for the next 20 years, the board chairman of Norfolk and Western testified before a Senate committee. Coal volume to overseas points could increase by 30 to 100 percent by 1990 and could triple by 2000. Although N&W forecasts that traditional export of metallurgical coal from Appalachia could decline, the total volume will be up because of steam coal. Steam coal requires new transshipping facilities that present problems in urban areas but can be adequately handled. The major constraint at Hampton Roads, Va., N&W coal port, is inadequate channel depth which Army Engineers see as taking a decade to correct.

Fishwick, JP (Norfolk and Western Railway) *Railway Age* Vol. 181 No. 22, Nov. 1980, p 42, 1 Phot.

ORDER FROM: ESL

DOTL JC

20 324933

**THE EXPORT COAL BOOM: HOW LONG? HOW STRONG?**

Chessie System has experienced a heavy increase in coal transport, particularly for export to some European countries. This increase makes it necessary to adapt installations in its marshalling yards and ports.

Kizzia, T *Railway Age* Vol. 181 No. 14, July 1980, pp 78-80, 2 Phot.

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

DOTL JC

20 325702

**EPRI'S PROJECTION OF ELECTRICAL ENERGY: DEMAND AND SUPPLY**

The percentage of U.S. energy devoted to producing electricity increased from 25 percent in 1970 to 30 percent in 1980 and is predicted to continue to grow with coal and nuclear power being the main energy sources in 2000 when natural oil and gas will no longer be used for power. Coal production will have to triple to 2 billion tons/year by 2000; productivity and transportation have been examined with the conclusion that their improvement will be difficult but possible.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Esselman, WH (Electric Power Research Institute)  
PLM, Incorporated Conf Paper 1980, pp 9-22, 11 Fig., 1 Tab.

ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

20 325703

**GILLETTE-ORIN: ON THE ROAD TO ENERGY INDEPENDENCE**

While railroads have been criticized for their high unit-train rates and poor performance in handling Western coal, Burlington Northern is in the midst of a \$2 billion, 10-year program that is producing facilities which are now under-utilized because electric power output has been lower than projected; environmental regulation has cut demand for Western coal; utility conversion to coal has been slowed by government policy; utilities have continued outmoded plants in service; and new Western mines have opened without prior sales commitments. BN finds poor cycle performance for unit coal trains is not exclusively a railroad problem and carbuilders' defects in new coal cars have also affected car utilization.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Donahue, MM (Burlington Northern, Incorporated)  
PLM, Incorporated Conf Paper 1980, pp 23-31



ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

20 325704

## EVALUATING COAL TRANSPORTATION OPTIONS TO UPPER NEW YORK

There will be a significant increase in coal consumption in upstate New York in the decade ahead, although growth will not be as large as some have predicted. Rail transportation will remain the dominant, but not exclusive, mode of shipment of coal to New York. The extent to which Western coal can penetrate the market on Lake Erie will depend on transport costs and the establishment of severance taxes imposed by Western states.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Vrooman, KD (Niagara Mohawk Power Corporation)

PLM, Incorporated Conf Paper 1980, pp 33-40, 6 Fig.

ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

20 325707

## OUR PLANS FOR OBTAINING, TRANSPORTING AND BURNING COAL ALONG THE GULF COAST

Gulf States Power, serving Texas and Louisiana, has burned only oil and natural gas but will be relying on coal and lignite for 30 percent of its fuel requirements by 1989. Western coal transported by unit trains and lignite burned at Texas mine-mouth stations are seen as the major new fuels GSP will utilize. The role of transportation in this planning is discussed.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Kautzman, RR (Gulf State Utilities)

PLM, Incorporated Conf Paper 1980, pp 99-109, 4 Fig.

ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

20 325781

## COAL-BRIDGE TO THE FUTURE. REPORT OF THE WORLD COAL STUDY

The study reflects the conclusions of 38 individuals holding key positions in government, private and public institutions in 16 countries. Some of the major conclusions of this study are: (1) Even under the moderate energy growth assumptions of the study, world coal production will have to increase 2.5 to 3 times, and the world trade in steam coal will have to grow 10 to 15 times by the end of the century. (2) Coal will have to supply between one-half and two-thirds of the additional energy needed by the world during this period. (3) Coal is already economically competitive in many locations for the generation of electricity and in many industrial and other uses and (4) The amount of capital required to expand the production, transport, and user facilities to triple the use of coal is within the capacity of domestic and international capital markets. Coal will be the "swing energy source" since there will be a period during which the oil supply will not be sufficient to support growth in demand for energy because alternate energy sources have not yet been developed. The report says that technically and economically recoverable reserves (of coal) are large enough to support 1977 production rates for another 250 years and are five times proven world oil reserves.

Future Coal Prospects is the companion volume and is the Second and final World Coal (WOCOL) report.

Wilson, CL

Ballinger Publishing Company, Massachusetts Institute of Technology 1980, 247p

Contract EX-76-A-01-2295

ORDER FROM: Ballinger Publishing Company, 17 Dunster Street, Cambridge, Massachusetts, 02138

20 325902

## WEST SHOWS SOLID GROWTH

Economists see the West providing 40% of total U.S. coal production in 1985, 50% five years later. New mines, rail lines and slurry pipelines to carry the additional tonnage are being developed.

Coal Age Vol. 85 No. 5, May 1980, p 93

ACKNOWLEDGMENT: EI

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20 325905

## COAL: PROBLEMS AND PROSPECTS IN THE 1980S

The great expectations of a major coal boom in the late 1970s and early 1980s have been dampened by the increased availability of oil and the downward pressure which this has exerted on world oil prices. Some energy specialists, feel this is a temporary phenomenon, and that by the mid-1980s at the latest there will be upward pressure on world oil prices. This will stimulate the demand for coal in the United States, both for direct consumption and for conversion to oil and natural gas. The result would be rapid expansion of the coal industry in the 1980s. Environmental regulations, labor problems, and capital availability will be issues that policy makers, management, and labor leaders will have to deal with. But there is nothing on the horizon that could be regarded as an overriding obstacle to an annual production rate of about 1.2 billion tons by 1985.

Miernyk, WH (West Virginia University) *Journal of Energy and Development* Vol. 5 No. 1, 1979, pp 9-18

ACKNOWLEDGMENT: EI

ORDER FROM: Colorado University, Boulder, International Research Center for Energy & Economic Dev, Boulder, Colorado, 80309

DOTL JC

20 329954

## INTERMODAL TRAFFIC, ONE OF THE RAILWAY'S CHANCES FOR THE FUTURE

With intermodal traffic, a through transport chain for door-to-door transport without transshipment is made available to the transport market from the viewpoint of increasing pressure to rationalize the situation in the energy sector. Suitably coordinated technical elements, such as pallets, containers, demountables, rail/road vehicles and transshipment installations are prerequisites for this transport chain. For the example of rail vehicles it is shown which problems had to be solved: what traffic could be transported without demountables and containers could be transported without difficulties by the rail vehicles used for intermodal traffic within the existing limited clearance gauge of the lines. The importance of this modern transport system is demonstrated by the medium-term and long-term development of the market and the relevant technical activities. The railway fully utilizes its chance in this area and is additionally assisted by the transport policy through the provision of funds and by pertinent research projects. Thus, the Intermodal Traffic will gain a stronger foothold on the transport market which will become impossible without it. [German]

Voss, M *Glaser's Annalen ZEV* Vol. 104 No. 8-9, Aug. 1980, pp 224-232

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

21 314246

**THE TRANSPORTATION SYSTEM'S CAPACITY TO MEET GRAIN EXPORT DEMAND-1979/80 OUTLOOK**

Heavy movement of grains and soybeans for export have aggravated the U.S. inland transportation network and port facilities. While the system has met past agricultural demands, it appears that the inland transportation network may be a limiting factor in meeting current grain export demand. With record agricultural exports projected in 1979/80, the transportation system will be under significant pressure to meet the needs of agricultural shippers this fall and winter.

Gaibler, FD

Economics, Statistics and Cooperatives Service Oct. 1979, 29p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-175243

21 314441

**RAILROAD CLASSIFICATION YARD TECHNOLOGY. DESIGN METHODOLOGY STUDY**

The report documents the first phase of a three-phase effort to develop a railroad classification yard design methodology. Topics discussed include: site selection, hump grade profile design, sub-yard capacity requirements, trim-end conflict resolution, yard geometry and layout, yard hardware systems, and yard computer systems.

Wong, PJ Elliott, CV Kiang, RL Sakasita, M Stock, WA  
SRI International, Transportation Systems Center, Federal Railroad Administration, (SRI-6364) Intrm Rpt. FRA/ORD-78/67, Sept. 1978, 50p

Contract DOT-TSC-1337

ACKNOWLEDGMENT: NTIS

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PB80-190481, DOTL NTIS

21 314760

**CONTAINER CRANES-ULTIMATE EFFICIENCY AT A PRICE**

The gantry crane represents the most expensive single item of handling equipment in a container terminal, and regardless of the landside handling systems incorporated, is the common factor in the majority of high and medium throughput container terminals. While various attachments can be fitted, the nature of the terminal often renders the unit inflexible, but when handling containers the gantry crane is considerably more efficient than other ship-to-shore handling systems. While there is scope for design improvement, particularly with regard to improving operation and maintenance crane specification remains very much an operator's prerogative.

Banks, JS *Cargo Systems International* Vol. 7 No. 4, Apr. 1980, p 47

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21 319646

**CRANE AUTOMATION--A WIDER APPLICATION?**

As long as the container terminal retains its status within the transport chain, then improving the efficiency of this interface--and thus its craneage which is the mainstay of this activity--will remain paramount. Automation is arguably the best solution, but it is by no means clear how appropriate it is to specific crane designs, or how its adoption fits in with current handling practices and economics. Also to be reconciled there is the problem of tailoring a new role for operating personnel.

*Cargo Systems International* Vol. 7 No. 1, Jan. 1980, p 37

ACKNOWLEDGMENT: EI

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21 319647

**TERMINAL SURFACING--HIGHER LOADS TO SUPPORT**

The compatibility of surface material to the handling equipment which operates over it is today a prime cost consideration for marine terminals. With the uprating of established handling systems and the introduction of new systems, particularly those of the unit load school, new generation handling equipment has been introduced invariably featuring high wheel loadings. Perhaps more than any other factor this has had a detrimental effect on pavement life and maintenance. This article assesses the merits of the different types of surfacing with particular emphasis on the impact of wheel loadings.

*Cargo Systems International* Vol. 7 No. 1, Jan. 1980, p 67

ACKNOWLEDGMENT: EI

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21 319925

**THE NATIONWIDE CLEARINGHOUSE**

Status of the recommendations and experiments of the AAR Freight Car Utilization Program is described. A proposal to make all general-service cars freely loadable has been made; a preliminary step has been the so-called Clearinghouse group of 11 railroads where the concept has been under test. Other experiments include a current investigation of about such special-purpose equipment. Specific recommendations have been made on means of increasing car productivity; unit trains and contracted services can help but an area of concern is individual car movements.

Roberts, R *Modern Railroads/Rail Transit* Vol. 35 No. 7, July 1980, pp 53-56, 1 Phot.

ORDER FROM: ESL

DOTL JC

21 319926

**TRANSPORTATION MANAGEMENT: CHESSIE'S FUNCTIONAL APPROACH**

Chessie System has consolidated and revamped the management of its transportation department, expanding regional and divisional jurisdictions and developing a more functional organization down to the division level. Major staff functions now include operations, coal transportation, planning, and car utilization.

Rayburn, RG (Chessie System) *Progressive Railroading* Vol. 23 No. 7, July 1980, pp 37-42, Photos.

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

DOTL JC

21 319928

**ECHO AIMS AT YARD EFFICIENCY**

Using portable radar units, Santa Fe has been measuring car speeds as part of its Efficient Car Handling Operation (ECHO) program. This systematic auditing in classification yards has led to improved car handling, reduced claims, and changes in retarding devices.

*Progressive Railroading* Vol. 23 No. 7, July 1980, pp 69-70, 2 Phot.

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

DOTL JC

21 319947

**COMPUTERISED STUDY OF TRAFFIC ON A DOUBLE-TRACK****LINE [Application de l'informatique a l'etude d'une ligne a double voie]**

To determine the maximum possible throughput of a line in terms of number of trains per unit of time and saturation traffic, the SNCF Transport Management uses a simulation model known as CID (Cout, Investissement, Debit) applicable to lines with double, triple or quadruple tracks, but which cannot be used for two-way working or single-track lines. [French]

Verdon, L *Revue Generale des Chemins de Fer* Apr. 1980, pp 223-230, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

21 319953

**LAWS GOVERNING THE SATURATION OF MARSHALLING****YARD INSTALLATIONS [Zakonomenosti nasyscenija ustrojstv sortirovochnykh stancij vagonami]**

In order to reduce freight car detention at reception and departure sidings and to spread classification rationally over marshalling yards, certain data is required, particularly that used for forecasting the capacity of a yard and determination of the influence of this factor on the qualitative indices of its functioning. [Russian]

Tiskin, EM Klimanov, VS *Vestnik VNIIT* No. 2, 1980, pp 6-9, 4 Fig., 1 Tab., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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

21 319974

**OPERATIONAL CHOICES FOR INTERMODAL TERMINALS:  
"CONTAINER SILO" [Scelte operative nei terminal intermodali: "un silo per container"]**

The article attempts to define a design for a container silo taking into account the general structure that would be required and the equipment to be used for handling. [Italian]

*Trasporti Industriali* No. 251, Jan. 1980, pp 37-39

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Etas Kompass Periodici Tecnici S.p.A., Via Mantegna 6, 20154 Milan, Italy

21 320302

**OPERATING STATISTICS OF CLASS I LINE-HAUL RAILROADS  
IN UNITED STATES, STATEMENT M-200, 1920-PRESENT**

Gives selected items for freight and passenger service by region for individual railroad for quarter and quarter a year ago. Fourth quarter reports give data for calendar year.

Hardcopy.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (302)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

21 322177

**RAIL TERMINAL SEQUENCING SYSTEM. GENERAL DESIGN  
MANUAL**

This General Design Manual states the guidelines and standards for the development and operation of the Rail Terminal Sequencing System. Development of these guidelines and standards involved the definition of operating practices, policies and procedures of the demonstration site yard and operating characteristics and features of the System. The system provides rail classification yard management with a tactical planning and control tool which is needed to reduce car delays in terminals and the percentage of missed connections. It is a tool which provides benefits beyond the selection of optimum hump sequences in that operating disciplines of a yard are consistently applied within the philosophy of customer service and freight car utilization.

AAR's Freight Car Utilization Program, Phase Two, Task Force 2. Prepared in cooperation with Cybernetics and Systems, Incorporated.

Deloitte Haskins & Sells, Association of American Railroads Nov. 1978, 100p, Apps.

Contract DOT-FR-771-5279

ORDER FROM: AAR

DOTL RP

21 322178

**RAIL TERMINAL SEQUENCING SYSTEM. STAGE 1  
FEASIBILITY REPORT**

The objective of the Terminal Sequencing System is to provide yard operating personnel with an effective tool for evaluating processing alternatives, thereby extending their planning horizon. While the system will generate suggested processing sequences, terminal management will retain ultimate control and will rely upon their railroad experience as the final determinant. Based on the availability of data and compatibility with operating conditions, the Louisville and Nashville Strawberry Yard is capable of using the Terminal Sequencing System (TSS). A review of operating practices at Strawberry Yard shows a need to emphasize system-wide management objectives in the tactical decision-making process. Because TSS will have system-wide and local yard objectives built into its logic, it will be able to consider many more of the factors influencing the sequencing process than manual evaluation could. Yard personnel have identified decision criteria currently used for determining hump sequences. Factors which should be considered in the TSS and which may not be considered adequately at present include system-wide objectives such as on-time performance, service reliability, and increased freight car utilization. Tactical planning processes appear to be on a one-train-at-a-time basis, which reduces the planning horizon to little more than 6 to 8 hours on the average.

AAR's Freight Car Utilization Program, Task Force 2. Prepared in cooperation with Cybernetics and Systems, Incorporated.

Deloitte Haskins & Sells, Association of American Railroads July 1978, 41p, 3 Fig., 3 App.

Contract DOT-FR-771-5279

ORDER FROM: AAR

DOTL RP

21 322179

**RAIL TERMINAL SEQUENCING SYSTEM. DETAIL DESIGN  
MANUAL. VOLUME I AND VOLUME II: APPENDICES**

This Detail Design Manual defines the system logic of the Rail Terminal Sequencing System and serves as the basis for EDP Analysts and programmers to convert the design into an operational computer system.

AAR's Freight Car Utilization Program, Phase Two, Task Force 2. Prepared in cooperation with Cybernetics and Systems, Incorporated.

Deloitte Haskins & Sells, Association of American Railroads Apr. 1979, v.p., Figs., Apps.

Contract DOT-FR-771-5179

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DOTL RP

21 322181

**THE CAR CYCLE ANALYSIS SYSTEM. INTERIM PROGRESS  
REPORT**

This report documents results of the car cycle analysis project. Primary objective was to determine where freight cars spend their time and identify utilization problems. Car cycle analysis was to provide a more detailed and disaggregated look at the cycle than had been possible in the previous effort. The system was designed to produce cycle data from actual car movement data provided by the railroads. A statistically representative sample of 8500 general-service box cars and gondolas was based on detailed analysis of the ICC 1 percent waybill sample. Software was implemented to merge Train II and CLM data and perform some editing and sequencing of data. Results are presented separately for box cars and gondolas.

Phase I, Task Force III.

Association of American Railroads AAR R-298, Feb. 1978, 27p, Figs., Tabs.

ORDER FROM: AAR

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21 322182

**DEMONSTRATION OF DYNAMIC TRACK ASSIGNMENT  
PROGRAM PHASE I REPORT**

This project expands Southern Pacific's CACTUS (Computer Assisted Classification Track Utilization System) computer program to incorporate numerous enhancements and modifications necessary to assist a yardmaster in making real-time track assignment decisions in an actual field trial. The prototype program developed maximizes classification track use and minimizes switch-engine work while producing a simple yard inventory capable of providing a track standing inventory of cars and of moving cars within the inventory.

Wong, PJ Elliott, CV Hathorne, MR

SRI International, Southern Pacific Transportation Company,  
Association of American Railroads June 1979, 58p, 23 Fig., 1 Tab.

ORDER FROM: AAR

DOTL RP

21 322184

**ALTERNATIVES FOR IMPROVING FREIGHT CAR  
MANAGEMENT**

This report describes and evaluates car management alternatives and recommends that railroads pursue those which they find most promising and compatible with their particular circumstances and management style. To create effective car management, railroads should: Explicitly incorporate freight car productivity into corporate strategy; develop car productivity goals and objectives for each management function; designate a group (newly created or one already existing) to be responsible for car management; create interfunctional coordinations mechanisms; and install the information systems needed to plan and control car related decisions and their outcomes.

Phase II, Task Force 1.

Association of American Railroads Final Rpt. AAR R-426, Apr. 1980, 38p

ORDER FROM: AAR

DOTL RP

**21 322185****ANALYSIS OF CAR SERVICE RULES ORDERS, AND DIRECTIVES. THE IMPACT OF CAR SERVICE RULES ON UTILIZATION**

This report presents an analysis of the impact of the car service rules and directives on car utilization. The analysis tabulates from the AAR TRAIN II history file the loaded and empty cycle times for the three-month period, July through September 1977, of all plain and equipped 50-foot boxcars built in the years 1974-76. This large sample includes cars moving under every type of rule except ICC Service Orders. The analysis shows RAILBOX cars achieve the best utilization and their utilization is most closely approached by Clearinghouse cars and cars moving under Rules 1 & 2. Boxcars moving under directives show the worst utilization. When cycles are separated between those where cars are unloaded off line, even sharper differences appear. Cars exempt from Rules 1 & 2 by ICC order (all of which bore line reporting marks) have about the same empty cycle as non-exempt cars unloaded away from home and about two days longer than RAILBOX, suggesting that their higher rental costs handicaps them or that car distributors are not fully aware of their free loadability. All of these findings demonstrate that freer loadability leads to better car utilization.

Association of American Railroads AAR R-369, May 1979, 19p

ORDER FROM: AAR

DOTL RP

**21 322187****IMPROVING RAILROAD TERMINAL CONTROL SYSTEMS: A CASE STUDY OF SOUTHERN RAILWAY'S BROSNAN YARD. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 28**

This study shows that a terminal control system that includes a volume variable car cost budget based on flexible connection standards can be incorporated within an existing terminal control system. Although the implementation of such a control system may require major modifications to the existing management process, there are few significant modifications to the management information system. By adopting such a control system, a railroad would have the capability to monitor and control service reliability and car utilization in terminals. In addition, the operating officers of the railroad would be given the ability to evaluate the terminal superintendent in an equitable manner because the expected performance of the yard changes to reflect the environment within which the yard is operating. This report also includes a brief survey of the state of the art of railroad terminal control systems. The survey's results show that at the terminal level, most railroads budget only crew costs and place less emphasis on car cost. In addition to describing Southern's existing terminal control system in detail, this work shows how existing reports can be modified to incorporate the flexible connection standards described above. Since Southern did not previously control car cost at the terminal, a series of new reports aimed specifically at monitoring car cost is proposed.

Task Force II, Phase 2.

Ferguson, WL

Massachusetts Institute of Technology, Association of American Railroads  
Final Rpt. CTS-80-2, AAR R-412, Apr. 1980, 167p, Figs., Tabs., 4 App.

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

**21 322188****THE RELATIONSHIP BETWEEN POWER AVAILABILITY AND FREIGHT CAR UTILIZATION. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 30**

Power availability and the strategy for using power in rail operations are key determinants of freight car utilization and service reliability. Increasing power availability will reduce delays in assembling and departing trains, reduce tonnage left behind because of tonnage constraints, and relieve congestion. This report presents a framework for balancing the costs of power availability against the costs of poor service and utilization. Both power availability and power requirements can be expressed in terms of gross ton-miles per unit time. Power availability can be related to the number of locomotives, the serviceability ratio, horsepower/ton requirements, and productivity measures, while power requirements can be related to traffic

flows, the physical network, and the operating/service plan. As power requirements increase relative to power availability, service deteriorates, as illustrated in a study of system performance for a major railroad. Successful power management recognizes this relationship in adjusting the appropriate elements of power availability of the operating/service plan and of power requirements as traffic flows fluctuate.

Phase II, Task Force 2.

Mao, CK Martland, CD Sussman, JM

Massachusetts Institute of Technology, Association of American Railroads  
Final Rpt. CTS-80-4, AAR R-413, Apr. 1980, 72p, Figs., 3 App.

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

**21 322189****THE MIT SERVICE PLANNING MODEL. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 31**

The Service Planning Model provides a low cost, realistic way of evaluating alternative operating plans. This report is a functional description of the model, which has been used successfully in studies with the Boston & Maine and the Santa Fe railroads to help evaluate alternative operating plans and establish service standards. The model's major asset is its ability to produce detailed customer service information, including O-D trip time distributions. These are developed using probabilistic train connection standards rather than cut-offs. By summarizing operating costs and estimating car utilization costs, the model helps in balancing car costs and the costs of train and yard operations. The principal inputs to the model are train schedules, blocking information, the network description, and probabilistic train connection standards. The model uses this information, with logic similar to that used in car scheduling, to predict O-D and yard time distributions. Rather than simulating the movement of thousands of cars through a complex network, the model uses analytic techniques to estimate trip times. As a result, the model requires much less time for data preparation and much less computer expense per run (currently in the range of \$50 to \$100 per run). This means that the model can be used frequently in many kinds of studies.

Phase II, Task Force 2.

McCarren, JR Martland, CD

Massachusetts Institute of Technology, Association of American Railroads  
Final Rpt. CTS-80-5, AAR R-407, Apr. 1980

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

**21 322191****MANAGING RAILROAD CAR DISTRIBUTION**

After a study of car distribution, Task Force 5 recommended the following changes to achieve improvement within the industry: (1) An interdepartmental planning effort should be initiated to create and implement a corporate car use plan; (2) Car distribution should itself implement a "bottom-up" car use plan; (3) Empty car supply forecasting procedures should be adopted; (4) Collection of car order data should be formalized and centralized; (5) New approaches to short-term fleet-sizing decisions should be adopted; (6) Use of manually prepared directives should be supported by formal flow-rule planning.

Phase II, Task Force 5.

Association of American Railroads Final Rpt. AAR R-414, Apr. 1980, 36p

ORDER FROM: AAR

DOTL RP

**21 322218****THE DESIGN OF A MANAGEMENT CONTROL SYSTEM FOR RAILROAD FREIGHT TERMINALS. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 27**

Rail freight terminal control systems can be improved by enhancing terminal budgets and performance reports to make terminal officers directly responsible for the reliability of train connections and for car costs. In existing terminal control systems, the costs associated with car time are not budgeted and connection standards, if they exist, are not related to actual operating conditions. These features distort the terminal management process, to the detriment of reliability and car utilization. The proposed terminal control system uses flexible connection standards for reliability and



average yard time, unit costs linking car time to car cost, and a volume variable car cost budget that is integrated with the operating conditions, so that budgets can be developed after the fact. A series of performance reports suggests how to incorporate these new concepts with an existing management information system.

Task Force II-Phase II.

Rothberg, SC Sussman, JM Martland, CD  
Massachusetts Institute of Technology, Association of American Railroads  
Final Rpt. CTS-80-1, AAR R-417, Apr. 1980, 54p, 2 Fig., 2 Tab.

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

DOTL RP

## 21 322505

### DRIVING EXTRA HEAVY TRAINS: EXPERIENCE AND

#### PROBLEMS [Vozdenie poezdov povysennogo vessa: opyt i problemy]

The writers discuss results concerning the driving of extra long and heavy trains on the Moscow network. They refer to a number of questions to be solved and make proposals for increasing efficiency and experience of railway staff in the Moscow area, with a view to speeding up freight deliveries and ensuring the operating reliability of the locomotives. [Russian]

Cerepasenec, RG Maksimov, NV *Zheleznodorozhnyi Transport* No. 3, 1980, pp 5-7

ACKNOWLEDGMENT: International Union of Railways, BD

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

## 21 322506

### AN ANALYTICAL MODEL FOR CALCULATING THE TRAFFIC CAPACITY OF RAILWAY LINES [Un modello analitico per il calcolo della capacita di circolazione delle linee ferroviarie]

After rapid examination of the general structure and limits of existing models for calculating the traffic capacity of a railway line, the authors describe a new model which takes account, in calculating delays, of the minimum headway between trains and the availability of sidings and passing tracks. They also give the results of the application of the model to a hypothetical section of line with trains belonging to 4 categories, with different speeds and priorities. [Italian]

Cascetta, E Nuzzolo, A *Ingegneria Ferroviaria* Vol. 35 No. 2, Feb. 1980, pp 118-126, 8 Tab., 6 Phot., 3 Ref., 2 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

## 21 322518

### ROAD DELIVERY VEHICLES FOR COMBINED TRAFFIC

#### [Strassenzustellfahrzeuge fuer den kombinierten Verkehr]

The authors begin with an introduction to the subject of delivery vehicles for medium-sized containers, semi-trailer tractors and semi-trailers for large container traffic, and semi-trailers for large container traffic, and then describe the vehicles used by the German Federal Railway. Technical details are given together with illustrations of these vehicles.

See also Vol. 31 No. 6, pages 240-248.

Petzoldt, G Juschka, H *Eisenbahningenieur* Vol. 31 No. 5, 1980, pp 211-219, 2 Fig., 2 Tab., 19 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

## 21 322548

### RENFE: A CONTAINERISED RAILWAY SYSTEM MATURES

Over the past eight years, a large-scale investment programme by the Spanish railway authority RENFE has resulted in the construction of container handling terminals throughout the country, and the purchasing of a large number of containers. It appears, however, that if the plan is to meet with total success, problems in various areas of the operation must be overcome. These include the changing of certain laws governing box movements on the one hand, and maintaining a low tariff structure on the other.

Hicks, P *Cargo Systems* Vol. 7 No. 7, July 1980, p 62

ACKNOWLEDGMENT: British Railways

ORDER FROM: CS Publications Limited, 115 Bedford Road, London SW4 7RA, England

## 21 322560

### ENHANCEMENT OF LINE CAPACITY ON SOVIET RAILWAYS

The author discusses the various ways of enhancing line capacity and the technical and economic evaluation of these measures.

Kulaev, KV *Rail International* Vol. 11 No. 6, June 1980, pp 345-355

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

## 21 322577

### U.S. MINES LOOK TO AUTOMATED RAILS

An overview is given of the automated coal-mine rail haulage in the U.S., and the safety benefits it promises. Studies have found driverless trains and automatic loading and dumping to be commercially attractive and technically feasible. The design of automated rail haulage in underground coal mines is discussed in some detail.

Mighdoll, P (Booz-Allen and Hamilton, Incorporated) *Coal Age* Vol. 85 No. 4, Apr. 1980, pp 90-94

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

## 21 322580

### COST MODELS FOR COAL TRANSPORTATION BY COMMON CARRIER. APPENDIX 1: USER'S MANUAL. FINAL REPORT

This manual provides the technical information needed to operate the computerized transportation cost models developed in EA-675, cost Models for Coal Transportation by Common Carrier, prepared for the Electric Power Research Institute by Manalytics, Inc., March 1979. Three models were developed: one for rail; one for inland river, Great Lakes, and for transfer of coal between rail and barge at intermodal trans-shipment points. The models calculate the cost of owning, maintaining, and operating transportation and related equipment, including; propulsion equipment (locomotives or tugboats), load-carrying equipment (hopper cars or barges), crew costs, fuel costs, maintenance costs, other operating costs, and the cost of capital. They offer a variety of operating options, involving unit trains or through trains; towboats dedicated to a set of barges or towboats that swap barges at one or both ends of a trip; train or flotilla size; trip distance; rail terrain; rail regions for wage-rate distinctions; barge trips over open water, over pools behind locks, and through locks; intermodal transfer; and (for deepwater transportation) self-propelled or towed vessels, vessel size and draft, and trip distance. The models use basic technical performance and cost values developed for our analyses (the default values). Other users, however, can override the default values with their own measures of technical performance and cost. The default values are variable costs, which account neither for overhead nor for profit, although other users may assign overhead or profit to the parameters as needed.

White, SJ Hynes, JP

Manalytics, Incorporated Jan. 1980, 209p

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: NTIS

## 21 322783

### ON THE TRANSPORTATION USE CONTROVERSY: AN ANALYSIS OF CAR SERVICE AND BOXCAR UTILIZATION IN THE MOVEMENT OF FOOD PRODUCTS

The general purpose of this study was to evaluate differences in fleet management practices for box cars in private versus assigned service. The objective was to estimate the effects of car service on utilization of 2 of 15 designated types of cars: non-mechanical refrigerations (insulated Type RB or RBL) and equipped box cars. The focus was on transport-related use with primary interest in determining if shippers use non-railroad-owned cars differently than railroad-owned cars and what effect car service or car ownership has on car cycles, surplus days and storage activity. Three firms in the food products business provided data for analysis covering a one-year period.

Tyworth, JE (Pennsylvania State University, University Park) *Transportation Journal* Vol. 19 No. 4, 1980, pp 5-14, 5 Tab.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

DOTL JC

21 322795

#### INDIA BUILDS MERRY-GO-ROUND LINES TO FOUR POWER STATIONS

Work is nearing completion on a line to link a new electric generating station with a coal mine 11 km away. For the first time Indian Railways shuttle or merry-go-round unit trains will be used to supply a power station with coal. Similar high-capacity power stations planned by the Indian government at three other points will be served in similar manner by permanently-coupled sets of hopper cars powered by diesel-electric locomotives running between pithead and power station over specially built lines.

Raina, RM Subramanian, VV (Rail India Technical & Economic Services, Ltd) *Railway Gazette International* Vol. 136 No. 10, Oct. 1980, pp 875-877, 2 Fig., 4 Phot.

ORDER FROM: ESL

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21 322904

#### RAILROAD TECHNOLOGY: CLASSIFICATION YARDS

Series of three articles includes: Outlook: Fewer yards, faster output; Queensgate quickens the pace in Cincinnati; Alyth: remodeling a model yard. First article discusses and discards the possibility of new yards differing significantly from arrangements now in use in North America and then examines the technical advances possible within the framework of the classic yard layout. It is seen inevitable, and confirmed by suppliers, that there will be fewer yards of any type and this will result only partially from the current merger movement. There could also be more potential in upgrading existing facilities rather than constructing all-new ones. Two approaches to the classic hump yard are then subjects of following articles: Construction of a new Chessie System yard in Cincinnati and the improvement possible in a pioneer automated facility of Canadian Pacific in Alberta.

Welty, G Malone, F *Railway Age* Vol. 181 No. 19, Oct. 1980, p 16, 4 Phot.

ORDER FROM: ESL

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21 322913

#### CENTRALISED CONTROL OF TRAIN FORMATION AND RUNNING FOR LONG, HEAVY TONNAGE TRAINS

[Dispetcerskoe rukovodstvo formirovanem i propuskom poezdov povysennogo vesa i dliny]  
No Abstract. [Russian]

Zak, EA *Zheleznodorozhnyi Transport* No. 4, 1980, pp 23-25, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

21 322917

#### USING ALL AVAILABLE MEANS TO INCREASE THE PERFORMANCE OF A MARSHALLING YARD [Tvoreckij poisk rezervov]

The article describes the preparation for and introduction of a new system for sorting and splitting up trains using a "NAIRI-K" computer, and the system for sorting long, heavy tonnage trains. [Russian]

Sienok, GM *Zheleznodorozhnyi Transport* No. 4, 1980, pp 26-29, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

21 322920

#### BASIC PLAN FOR MARSHALLING YARDS. INCREASE IN COMPETITIVENESS OF THE GERMAN FEDERAL RAILWAY AS A RESULT OF INVESTMENTS [Die Rahmenplanung für Rangierbahnhöfe. Steigerung der Wettbewerbsfähigkeit der Deutschen Bundesbahn durch Investitionen]

Properly-planned modernization of marshalling yards should result in definite long-term improvement of rail freight traffic's competitiveness. The

"station centers" introduced gradually from 1974, together with organizational and production planning measures, have made forwarding over short distances faster, more reliable and more profitable. Using the results of this concentration as a starting-point, together with the "transport chain" network, a basic plan for marshalling yards has been established. It represents an extension of a production planning concept coupled with investment projects which have proved to be successful. [German]

Redecker, E *Die Bundesbahn* Vol. 56 No. 7, July 1980, pp 449-452

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

21 322928

#### LINE THROUGHPUT, WEIGHT OF FREIGHT TRAINS AND FUNDAMENTAL PRINCIPLES GOVERNING THE SELECTION OF LOCOMOTIVES [Provoznaja sposobnost', ves gruzovyh poezdov i osnovnye principy vybora tzhagovyh sredstv]

Based on an analysis of standards which are used to determine the weights of freight trains on electrified main lines, the author sets out a method for selecting types of traction to give the highest possible line throughput. [Russian]

Lisicyn, AL *Vestnik VNIIT* No. 4, 1980, pp 1-9, 6 Fig., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

21 322939

#### COMBINED TRANSPORT: THE RAILWAY GUARANTEES THE CONTAINER CONNECTION. EXTENSION OF COMBINED TRANSPORT. RESEARCH PROJECT INTO NEW SYSTEMS

[Kombi-Verkehr: Bahn laesst Container "umsteigen". Erweiterung des kombinierten Verkehrs. Forschungsprojekt fuer neue Wege]

The Federal Ministry of Research and Technology has contributed 29 million DM towards a research project into new rail/road transshipment techniques for containers. A transshipment device that runs on rails which was developed in Hamburg can unload a container from a car, carry it along the track and load it onto another vehicle in just 2 min. Containers can therefore "change" in the course of a journey just like passengers. This equipment is now being tested in normal operating conditions. [German]

*Transport-Dienst* Vol. 53 No. 23, 1980, 15p

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schiffahrts-Verlag Hansa C Schroedter und Co, Stubbenhuk 10, 2000 Hamburg 11, West Germany

21 323201

#### WAYS OF INTENSIFYING CLASSIFICATION YARD OPERATION

The paper deals with the solution of problems involved in assessing the effectiveness of the known (traditional) ways of increasing the handling capacity of the facilities of major classification yards and treats new methods of intensifying their operation. Authors have considered the track layouts constructional solutions and the technology of operation proposed by them for the introduction of additional technological lines for the purpose of organising the parallel humping of trains, improvement in the technology of partial processing of through trains and so on. The high effectiveness of employing new methods of intensification of classification yard operation was confirmed.

Sotnikov, EA Tishkov, LB Strakovsky, II *Rail International* No. 7-8, July 1980, pp 428-447, 12 Fig., 7 Tab.

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21 323228

#### YARD AUTOMATION: REDUCING DANGER AND DAMAGE

Describes a complete system developed by ASEA for automatic control of the speed of humped, free-rolling wagons by a small spiral retarder. The system also uses a booster by which wagons are propelled.

Stenow, A *International Railway Journal* Vol. 20 No. 8, Aug. 1980, p 60

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

21 324418

**MODEL FOR THE BLOCKING OF TRAINS**

A nonlinear, mixed-integer programming model for the railroad blocking problem was developed. The objective of this model is to determine a classification strategy for all the classification yards in a railroad system at one time. The model can be viewed as a multicommodity flow problem with many additional side conditions.

Transport Supply Models, Selected Papers from the International Symposium on Travel Supply Models, University of Montreal, Quebec, November 17-19, 1977.

Bodin, LD (Maryland University, College Park); Golden, BL Schuster, AD Romig, W *Transportation Research. Part B: Methodological* Vol. 14B No. 1-2, Mar. 1980, pp 115-120, 5 Ref.

ACKNOWLEDGMENT: EI  
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21 324419

**MODELLING OF RAIL NETWORKS: TOWARD A ROUTING/MAKEUP MODEL**

The author proposes a hierarchical taxonomy of modeling issues and describes a class of models dealing with car routing and train makeup from the viewpoint of network flows and combinatorial optimization. The model proposed is compared with two previous rail network models and possibilities for algorithmic development are discussed.

Transport Supply Models, Selected Papers from the International Symposium on Travel Supply Models, University of Montreal, Quebec, November 17-19, 1977.

Assad, AA (Maryland University, College Park) *Transportation Research. Part B: Methodological* Vol. 14B No. 1-2, Mar. 1980, pp 101-114, 18 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

21 324488

**THERE IS NO SHORTAGE OF FREIGHT CARS--RAILROADS MUST MAKE BETTER USE OF WHAT THEY HAVE**

Railroads cannot satisfy the demand for freight cars because they do not use the existing car fleet efficiently. Enough cars are available, but they are not in the right place at the right time. Federal agencies can do little to substantially improve utilization. Federally financed research does point the way to improve car utilization techniques, but only railroad managers can make the operating improvements which will largely eliminate the illusive freight car shortage. To supplement improved utilization, railroads could use greater pricing freedom to defer peak demand for cars. The recently approved rail deregulation act permits greater pricing freedom but it is too early to evaluate this legislation's effects.

General Accounting Office CED-81-2, Nov. 1980, 83p, 6 App.

ORDER FROM: GPO

21 324492

**DETROIT TRIES A BOLD NEW APPROACH TO RACK CAR DISTRIBUTION**

Two automakers and 20 railroads are involved in a car utilization program which has FRA and AAR backing. Costly multi-level cars are being released from rigid distribution patterns, allowing shippers to get improved service and railroads to reduce empty car movements. While railroad share of new auto traffic has been declining, rate and service contracts in the wake of deregulation are proving popular with shippers. Work is proceeding also on reducing loss and damage and in improving the design of the rack cars.

Malone, F *Railway Age* Vol. 181 No. 22, Nov. 1980, p 16, 1 Phot.

ORDER FROM: ESL

DOTL JC

21 324920

**INTERMODAL: EVOLUTION AND REVOLUTION**

A review of activities in the combined transport sector during recent years in the United States. The techniques and innovations developed by the Railways are discussed, also the role of the Government, adaptations carried out in the terminals, and handling techniques.

Welty, G *Railway Age* Vol. 181 No. 14, July 1980, p 24, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

21 324924

**TRAIN FREQUENCY [Die Zugdichte]**

The running frequency on given routes is determined using a Gaussian distribution model. A procedure is shown which can be used for calculating train frequency based on measurement of line occupation. A basic diagram shows the relation between train frequency traffic density and speed. [German]

Potthoff, G *DET Eisenbahntechnik* Vol. 28 No. 7, 1980, pp 289-290, 4 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

21 324931

**THE PROBLEM OF ORGANISING TWO-WAY SHUNTING IN MARSHALLING YARDS [Zur Frage der Organisation des Parallelablaufs in Rangierbahnhöfen]**

The productivity of marshalling yards with a single set of tracks and automated gravity shunting installations may-- according to theoretical studies--be improved by two-way shunting. However the improvement in operations is limited by the problem of crossing traffic. A study shows that by means of pre-selection of the crossing traffic and corresponding constructional layout of the whole yard, two-way shunting can be practiced to increase productivity. [German]

Koenig, H *Rangiertechnik und Gleisanschlusstechnik* No. 39, 1979, pp 39-41, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

21 325439

**THE GRAY TRAIN DERAILS**

Recession's effects on traffic moved in box cars and improved car utilization by the railroad industry have produced a supply surplus with devastating effects on freight-car leasing companies and short-line railroads involved in tax-shelter car investments. The per-diem or utilization lease with short-line railroads calls for off-line revenues to be passed through to the owners who are responsible for ownership costs. With a car surplus, the high per-diem cars became too expensive for trunklines to use and thousands of box cars went into storage. While some of these cars are being re-leased or sold, the future market for investor-owner cars is being shaped largely by regulatory changes.

Pogue, WH, Jr *Railway Age* Vol. 181 No. 24, Dec. 1980, p 34

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21 325459

**DETERMINATION OF THE EFFECTIVENESS OF RAILROAD-CAR- DISTRIBUTION DECISION MAKING**

Most railroad organizations have defined and divided functions narrowly--around their visible physical activities such as moving trains, switching cars, and setting prices-- because it appeared to be the most efficient way to manage such a complex production process. Unfortunately, adoption of such a structure has meant that the level of service provided to shippers and the use of the railroad's capital assets are the indirect result of numerous and often unrelated decisions rather than the focus of managerial activity. To understand this problem, a single function-car distribution has been chosen for detailed investigation because it is an important determinant of both level of service and use of the freight-car fleet. Numerous operations research studies of car distribution have been conducted in recent years, but most have defined car distribution narrowly and ignored the broader organizational context within which car distribution actually functions. A framework is developed that is used to structure the analysis in a manner that permits consideration of both the physical elements of the production process and the managerial elements required to control it. Car distribution organization, information, and decision structures are described and analyzed. Eight major areas in which improvement appears to be necessary are identified, and the direction of future research in this area is briefly discussed.

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck, and Intermodal.

Philip, CE Sussman, JM *Transportation Research Record* No. 758, 1980, pp 8-18, 4 Fig., 9 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

## 21 325468

### TRADE-OFFS BETWEEN OPERATIONS AND ECONOMICS IN DOMESTIC USE OF CONTAINERS

Intermodal containers, as differentiated from piggyback trailers, have proved highly useful in international trade, primarily because they eliminate the reloading of cargo at each intermodal connection and the attendant delay, cost, damage, and opportunity for pilferage. However, physical constraints make containers less-economic transportation units per se than the individual modes that they replace-- truck trailer, rail boxcar, break-bulk ship, etc. When standard intermodal containers are included in the U.S. domestic freight transportation system, their operating shortcomings outweigh any theoretical advantages that may accrue to either shippers or carriers. Such shortcomings include relatively high tare weights, limited cubic capacities, and requirements for sophisticated loading and transfer equipment. Proposals to develop and adopt a form of domestic container raise the same questions of standardization, interchangeability, and retrieval that plagued the international container industry in its early years. Further, the proposal raises the yet more-serious question of the rationality of allocating resources to develop a separate series of domestic containers that could not be interchanged with the existing fleet of more than 1.1 million international containers, with an estimated replacement value (including interface equipment) of \$12.0 billion. This paper discusses the domestic operational restraints inherent in the use of international standardized containers and applies these to similar problems that might be anticipated for a variety of different domestic containers. (Author)

This paper appeared in *Transportation Research Record* No. 758, Surface Freight: Rail, Truck, and Intermodal.

Staley, RA *Transportation Research Record* No. 758, 1980, pp 72-74, 4 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

## 21 325880

### A REVIEW OF UNDERGROUND TRANSPORT SYSTEMS IN THE BARNESLEY AREA OF THE NATIONAL COAL BOARD

The co-authors demonstrate their philosophy related to continuous underground transport systems by using their experience in Barnsley area as an illustration. With the concept that mining is primarily a transport operation once the coal has been released at the coal face, the size of the task is fully defined. In turn, manriding, mineral and materials transport, and the relative merits of shaft and drifts as transport systems are discussed. The way in which their transport philosophy has and is affecting the design of all categories of transport systems is discussed, with special reference to the transport requirement created by the reorganization of the Barnsley area. Reference is also made to the application of the pressure belt system at Britain's newest operational mine-Royston Drift. The paper is concluded with a convincing demonstration that for Barnsley area drifts are rightly preferred over shafts, allowing as they do a continuation of the underground transport systems to the surface.(a)

Shepherd, C Gilbert, S (National Coal Board) *Mining Engineer* Vol. 139 No. 225, June 1980, pp 903-911, 2 Fig., 2 Tab., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 250318)

ORDER FROM: ESL

## 21 325932

### INCREASE IN TONNAGE AND TRAIN SPEEDS [Povyshenie vesovykh norm i skorostej dvizheniya poezdov]

The authors discuss a tonnage increase from 400 to 1000 tonnes, and even up to 3500 tonnes on some lines, and also the increase in train speeds, as decisive factors for increasing line throughput under the 10th Five-Year Plan on the SZD. [Russian]

Vasilenko, EA *Zheleznodorozhnyi Transport* No. 5, 1980, pp 13-16, 5 Fig., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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

## 21 326368

### INTERMODAL FREIGHT PROGRAM-PHASE II, DEMONSTRATION MANAGEMENT

The Intermodal Freight Program was established to develop and demonstrate profitable improved rail intermodal service (the movement of highway trailers and/or containers on rail flatcars). Emphasis was placed on developing the use of multiple frequency dedicated trains in intermediate distance markets (200-600 miles) dominated by trucks. Railroads operating demonstrations approved under the program were eligible for federal assistance covering 40 to 60 percent of operating losses during periods required to attain profitability. From June, 1978, through May, 1980, the Milwaukee Road operated a demonstration between Chicago and the Twin Cities (Minneapolis/St. Paul). The demonstration involved four dedicated intermodal trains each way each weekday in the corridor. Labor cooperation produced improved productivity in the service and improved capital utilization was attained through rapid equipment turns. A highly reliable service was developed. Milwaukee intermodal traffic in the corridor doubled from predemonstration levels with the additional business being attracted primarily from the highway. Profitability was attained during peak volume periods and possibilities for profit enhancement were identified. The experience gained during the demonstration should be of value to carriers considering similar services.

Yardley, CF

Association of American Railroads, Federal Railroad Administration  
Final Rpt. FRA/ORD-80/69, July 1980, 131p, 17 Fig., 12 Tab., 5 App.

Contract DOT-FR-708-5169

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB81-106510, DOTL NTIS, DOTL RP

## 21 329522

### CONTAINER SECURITY--WINNING A LOSING BATTLE?

Despite repeated calls for international codes of practice, no statutory procedure for ensuring container security has yet been officially introduced. Nevertheless, a greater awareness is being shown by shippers, road haulers, container and terminal operators towards the need for better cargo protection. Many effective security systems are now operated, with the equipment used in them steadily being raised in quality. Ultimately, though, security experts stress that real progress in the security sector is inextricably linked to financial considerations.

*Cargo Systems International* Vol. 7 No. 6, June 1980, p 103

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

## 21 329528

### MODELS FOR RAIL TRANSPORTATION

This paper reports on the existing literature models for rail transportation with two goals in mind: to collect and categorize rail modeling efforts, and to position the rail-related literature in the context of other transportation models and provide an introduction to this field for nonspecialists. Optimization, queueing, and simulation models are all treated with particular emphasis on optimization. The role of each class of models is discussed in relation to its function and its position within the total planning activity of a railroad. A concluding section outlines the major modeling obstacles and promising areas for future development.

Assad, AA (Maryland University, College Park) *Transportation Research Part A: General* Vol. 14A No. 3, June 1980, pp 205-220, 156 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

## 21 329943

### PERFORMANCE ANALYSES OF PASSING TRACK AND PLANNING PRINCIPLES FOR ITS LAYOUT ON SINGLE-TRACK LINES

This paper deals with correlation between the number of passing tracks, their spacing on a single-track line, and operation of trains at different speeds. By means of probabilistic analysis the line capacity and principles for planning siding location are obtained.

Yokota, H *Railway Technical Research Inst, Quarterly Reports* Vol. 21 No. 3, Sept. 1980, pp 105-114, 12 Fig., 2 Tab., 2 Ref.



ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji,  
Tokyo, Japan

DOTL JC

21 329953

## NEW RULES OF OPERATING SZD

New Railway Operating Rules, Signalling Instructions and Train Running and Shunting Operations Instructions have been introduced in the USSR. These were necessitated by the changing conditions of operation on the railways caused, primarily, by the ever growing demand of national economy for traffic capacities. In order to meet the requirements of the various branches of industry and agriculture, a necessity has arisen for further improvement of rolling stock utilisation, enhancing the reliability of transportation facilities and perfecting the organisation of labour. The article deals with the main formulations of the new documents issued by the Ministry of Railways regulating the rail transportation process.

Kharlanovich, IV *Rail International* Vol. 11 No. 9, Sept. 1980, pp 526-534

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

DOTL JC

22 189565

**BUREAU OF MINES REPETITIVE COMMODITY SURVEYS**

This data tape includes information from surveys of commodity producers for over 150 commodities indexed by (1) fossil fuels, (2) nonferrous metals, (3) ferrous metals, and (4) nonmetallic minerals. The individual commodity surveys usually cover commodity production/consumption, modal traffic flow, mining operations, distribution statistics, shipper attributes, and commodity attributes. The update cycle varies by commodity; surveys are conducted monthly, quarterly, semi-annually, and annually. The data are obtained from nonmandatory reports requested from each producer; in the case of nonrespondents, data are gotten from state mine departments, which have the statutory authority to require reports. Some of the data contained in this base can be found in the Bureau's annually published Minerals Yearbook. (See entry in this publication.)

Magnetic tape. Source data not available to the public.

Bureau of Mines Data Base No Date, n.p.

ACKNOWLEDGMENT: Bureau of Mines, Transportation Statistical Reference File, TSC (782)

ORDER FROM: Bureau of Mines, Office of Technical Data Service, Washington, D.C., 20241

22 314393

**AN EXAMINATION OF UNREGULATED SHIPPER ASSOCIATIONS**

Shipper associations are unregulated, non-profit organizations established by shippers to take advantage of quantity discounts and other transport savings. Typically, associations ship trailer loads of consolidated small shipments between major cities over 700 miles apart using TOFC ("piggy-back") service for the line haul movement of the freight. Although information about the industry is sparse, railroad data indicate that since the mid-1960's, shipper association tonnage has almost quadrupled, while that of their regulated counterparts, the surface freight forwarders, has declined by about 10 percent. Interviews with nine association representatives indicated that most firms join shipper associations to save money and that service quality (trip time and dependability) is comparable to that offered by freight forwarders and LTL common motor carriers. Several associations suggested that without the lower rates that they provided, member firms would ship less because they could not compete in distant markets. Comparison of the rates of five shipper associations with the rates of regulated LTL motor carriers and forwarders indicates that savings vary widely from slight negative values to over 40 percent. The median savings of associations in comparison to LTL motor carriers and freight forwarders were 18 percent and 21 percent, respectively.

Brown, TA

Brown (TA), Asst Secretary for Policy & International Affairs Final Rpt.  
DOT-P-50-80-17, Mar. 1980, 73p

Contract DOT-PS-90760

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-188329

22 316253

**CACI'S USE OF SIMULATION IN NATIONAL FREIGHT TRANSPORTATION MODELS**

A national freight transportation network model developed by CACI has been used for a number of simulation studies. Two of these are described in this paper, a freight transportation energy use study and the current National Energy Transportation Study. The paper is concluded with an application of these models in the commercial sector.

Model Simulation Proceedings Annual Pittsburgh Conference 10th, Vol. 10 University of Pittsburgh, Pennsylvania, April 25-27, 1979.

Baxter, W (CACI, Incorporated); Williams, F

Instrument Society of America Proceeding Part 4, 1979, p 1353, 14 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Instrument Society of America, 400 Stanwix Street, Pittsburgh, Pennsylvania, 15222

22 319687

**THE INFLUENCE OF COAL TRANSPORTATION COST ON THE OPTIMAL DISTRIBUTION OF COAL AND THE OPTIMAL LOCATION OF ELECTRIC POWER GENERATION PLANTS**

More coal moves on both railways and waterways than does any other commodity. As consumption increases, market patterns and the average distance it is hauled are changing significantly. This investigation is an attempt to define optimal regional coal markets to best serve the nation's rising energy needs. The analysis supports the thesis that real world conditions illustrated by spatial differentiation can be more thoroughly understood following careful theoretical generalization and empirical estimates. Changes in the pattern of coal utilization caused by the conversion from oil and natural gas, along with the opening of the western coal deposits and the shifts in consumption to new areas and new users, inevitably cause significant modifications in our market analysis and in optimal coal-hauling patterns. The theoretical model was developed in the first year and is presented in this report. Being a report in progress, the analysis is neither complete nor definitive. The initial empirical results and the model are being revised and redefined on the basis of structural changes in demand and supply and the impact on location of electric power generating plants until the optimal market patterns consistent with national energy policies are obtained. By following the model, savings will be possible both in transport costs and in energy consumption.

Campbell, TC Hwang, MJ

West Virginia University, Department of Transportation Final Rpt.  
DOT/RSPA/DPB-50/7936, Dec. 1979, 91p, 13 Fig., 25 Tab., 42 Ref.

Contract DOT-RC-82031

ORDER FROM: NTIS

DOTL HE18.5.A354

22 319697

**FREIGHT TRANSPORT DEVELOPMENTS: THE IMPLICATIONS FOR PLANNERS**

Developments that have taken place during the 1970's in freight transport are discussed. The major trends have been twofold-increasing size and increasing specialisation, whatever the mode of transport used. The significant developments of the decade are briefly described for each of the modes i.e road (85% UK freight tonnage)-a trend towards fewer but larger lorries; rail (10%) total freight carried dropped but specialist traffics and services increased. The importance of the freight industry to the economy is outlined and the implications for planners are discussed. The developments outlined point to the need to implement a realistic land use policy balancing the needs of the freight transport industry, those of manufacturing industry and retail trade served by it, and environmental requirements. The Greater London Council has a number of specific policy approaches to help meet London's needs, ranging from the general policy for industrial-commercial corridors, freight complexes, rail depots and river wharves, to the provision of small haulier depots. It is thought that more land will be needed to meet the demand for permanent freight centres, ranging from large freight complexes to small lorry parks. The primary financial and development role of the planner is said to be the provision of roads needed by the industry and minimising the environmental impact. (TRRL)

Howard, B (Greater London Council) *Planner* Vol. 66 No. 2, Mar. 1980, pp 34-36, 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 248714)

ORDER FROM: Royal Town Planning Institute, 26 Portland Place, London W1N 4BE, England

22 319704

**CONTROL OF DUST DURING COAL TRANSPORTATION**

Spraying of coal in an open top hopper car with an aqueous composition containing at least about 2.5% of a binder material consisting of solid material in an aqueous suspension of an asphalt emulsion or a black liquor lignin product and containing 0.1 to 2.0% of water soluble ethoxylated alkyl phenol or sulfo succinate wetting agent results in the formation of a crust layer which provides protection against loss of coal due to wind action during rapid movement of the car.

Doeksen, G

Cominco, Limited Patent Patent 4, 169,170, Sept. 1979, 8p

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Cominco, Limited, 200 Granville Square, Vancouver, Canada

22 319705

**PLACING THE SPECIAL TRAINS ISSUE IN PERSPECTIVE**

The contention of the Association of American Railroads (AAR) that special trains are necessary for handling spent fuel is discussed. These special trains would not move faster than 35 mph nor carry any nonradioactive freight. When a special train meets, passes, or is passed by another train, one train would stand still while the other moves past at a speed of less than 35 mph. The shippers feel these special trains are not necessary and that they would increase the cost of transporting spent fuel. Possible alternatives to the current standoff between railroads and shippers of radioactive material are mentioned.

Rhoads, RE Chais, M DeStee, JG Loscutt, WV  
Battelle Memorial Institute/Pacific Northwest Labs May 1978, 7p

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: NTIS

PNL-SA-6519

22 319927

**SOUTHERN FIGHTS BACK**

Southern Railway has undertaken a program of computerization, education and attention to detail in its fight against losses due to theft and vandalism. Management information, including field reports of cars containing the most vulnerable commodities, are used for policing and for determining where and when thefts occur. Education programs are conducted for employees, shippers and consignees to combat theft and for school children to suppress vandalism.

*Progressive Railroading* Vol. 23 No. 7, July 1980, pp 55-56, 4 Phot.

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

DOTL JC

22 319938

**ECONOMIC FEASIBILITY OF OFF-TRACK ELEVATORS**

The economics of a number of selected off-track elevator sites were examined on two alternatives; (i), the complete abandonment of the branch line with closure of all associated delivery points, (ii), maintenance of rail service only to points considered for potential off-track operation. This analysis was completed in October 1979 and subsequently an examination of seven additional branch lines was requested. The study focuses on the distribution of savings and costs with respect to government, railway, elevator company and producer. While drawing on previous work done on off-track elevators by the Commission on Grain Handling and Transportation (the Hall Commission) and the Prairie Rail Action Committee (PRAC), this study incorporates more recent information on the cost of rail, elevation, farm and commercial trucking. In addition, through the use of the Research Branch model on Producer's Haul and Elevator Receipts (PHAER) the study presents a more detailed analysis of grain distribution than contained in earlier studies. This is particularly true with respect to the off-track elevator. Considering the eleven subdivisions in aggregate, complete abandonment would result in the largest net savings of \$12.8 million per annum as against the present system of branch line operation and the anticipated high branch line rehabilitation costs. With the operation of off-track elevators, net savings of \$11.1 million would still be achieved. Nevertheless, the extra costs of trucking grain under complete abandonment are substantially less than the extra costs of all types associated with off-track elevators. This leaves open the alternative of a farm trucking subsidy.

Fleming, MS Yansouni, PA

Canadian Transport Commission No. 10-80-01, Aug. 1980, 81p, Tabs., 9 Ref.

ORDER FROM: CIGGT

DOTL RP

22 319997

**CONTAINER INFESTATION: THE REALITIES AND THE REMEDIES**

The problems posed by container infestation represent not only a threat to the socio-economic health of numerous nations, but also a counter force to the inherent advantages of the container system. However, experience in Australia shows these facts are not fully appreciated by many parties active in the container industry who could make a valuable contribution to reducing the scale of the problem. This is the major message contained

within the article on container infestation, compiled by A Catley, principal plant quarantine officer, Department of Health Australia.

Catley, A *Cargo Systems* Vol. 7 No. 6, June 1980, p 71

ACKNOWLEDGMENT: British Railways

ORDER FROM: ESL

22 320288

**QUARTERLY FREIGHT LOSS & DAMAGE CLAIMS, CLASS I LINE-HAUL RAILROADS**

Quarterly report on freight loss and damage claims paid by Class I line-haul railroads, by commodity, cause of loss (robbery, theft and pilferage, shortage), and location of loss. Contents consist of an introduction, map of railroad districts, list of railroads in each, and 9 tables, listed below. Data are comparable with quarterly loss and damage statistics reported for motor carriers of property. Tables: (Tables show number or percent and dollar amount of claims). A1. Summary of claims processed (by district). B1. Loss and damage claims paid, by commodity and cause (U.S. and by district). B2. Loss and damage claims paid as a result of robbery, theft and pilferage, and shortage, by major commodities. B3. Number and amount of claims paid due to known robbery, theft and pilferage, and shortage, by known state of occurrence. B4. Claims paid due to known robbery, theft and pilferage, and shortage by (6) known areas having largest dollar amounts paid (and by major commodities). B5. Number and amount of claims paid due to known robbery, theft and pilferage, and shortage as to where the first bad freight seal record was reported (and by major commodities). B6. Claims paid due to known robbery, theft and pilferage, and shortage by (6) areas having largest dollar amounts paid where the first bad freight seal record was reported and by major commodities. B7. Loss and damage claims paid involving piggyback traffic by commodity. B8. Loss and damage claims paid due to robbery, theft and pilferage, and shortage exceeding \$6000 per commodity.

Hardcopy. Data derived from quarterly reports (form QL and D-R) required.

Interstate Commerce Commission Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (288)

ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

22 320315

**CARGO SECURITY REPORTING SYSTEM-RAIL**

ICC Class I railroad data have been compiled since 1975. Information extracted from form QL&D-R, Schedule A and B. Schedule A contains revenue data, Schedule B contains theft-related loss data (shortages, theft or pilferage) per commodity as well as claims paid. Net operating income is derived from ICC form RE&I. Report titled: Cargo Security Statistics, Theft-related Losses of Class I Railroads.

Hardcopy, computer printouts. Data are obtained from ICC Data tapes (form QL&D-R). Additional Revenue information is obtained from ICC form RE&I through the Association of American Railroads.

Department of Transportation Quarterly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (315)

ORDER FROM: OST

22 320594

**CENSUS BUREAU MANUFACTURING AND MINERAL INDUSTRIES**

The annual survey of manufacturers is based on a scientific sample of manufacturing establishments and provides annual statistics for intercensal years on employment, payrolls, man-hours, value added by manufacture inventories, new capital expenditures, and value of products shipped-data which are shown in more detail in the census of manufactures reports. Current statistics on commodity production and shipments are issued in the current industrial reports series. Industry data are available in the area data files from the 1972 economic census covering manufacturing and mineral industries. The files include data on number of establishments, employment, payroll, man-hours, cost of materials, value of shipments, capital expenditures and inventories, quantity and value of materials consumed and products shipped for areas, states, and counties.

Paper copy and Magnetic tapes. Under Legislation enacted in 1964, the census of manufactures & mineral industries is to be taken in years ending in 2 and 7. Data are collected from all manufacturing establishments with 1 or more paid employees.



Bureau of the Census Monthly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (594)  
ORDER FROM: Bureau of the Census, Room 2102A, FB4, Suitland, Maryland, 20233

## 22 320781

### KEYSTONE COAL BUYERS MANUAL

This publication provides directories of coal producing companies and mines by state, consumer companies by type and state, tidewater coal piers, river docks, and companies engaged in river transportation of coal. Coal fields are shown and a map of the inland waterways system as well as coal fields and seams by state. Data are included on production of the 50 largest mines, and coal moved by unit trains and on inland waterways.

Papercopy (\$70.00).

McGraw-Hill, Incorporated One-Time No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (781)  
ORDER FROM: McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

## 22 320809

### IRON ORE

Areas in which iron ore is mined in the U.S. and Canada are defined, and gross tons of production and shipments are shown for each area. Statistics are also included on receipts, consumption and inventories at iron and steel plants by production and consuming areas (groups of states and Canada); Imports and exports; Shipments from loading docks destined to the great lakes; and production of pig iron and steel. A directory shows the name and address of mining companies. (Commodity production, commodity consumption, and shipper attributes).

Papercopy.

American Iron Ore Association Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (809)  
ORDER FROM: American Iron Ore Association, Bulkley Building, 1501 Euclid Avenue, Cleveland, Ohio, 44115

## 22 322174

### ECONOMIC IMPACT OF ALTERNATIVE GRAIN TRANSPORTATION SYSTEMS. A NORTHWEST MISSOURI CASE STUDY

This research was to determine a grain distribution system which would yield the highest net return to producers and marketers in northwestern Missouri. Report describes the existing grain marketing system; develops costs for storing, conditioning and transporting grain in terms of investment, operation and maintenance; identifies transportation rates and costs for each mode; develops projections to 1985 for grain production and consumption; analyzes a series of rail-based transportation/storage alternatives that are feasible; selects those alternatives that minimize costs; and discusses the implications for farmers, communities, transportation agencies and public policy makers.

Salomone, D Moser, DE Headley, JC  
Missouri University, Rolla Res Bulletin 1019, June 1977, 138p, 22 Tab., 16 Ref., 6 App.

ORDER FROM: Missouri University, Rolla, Agriculture Experiment Station, Rolla, Missouri, 65401

## 22 322565

### LONG DISTANCE FREIGHT TRANSPORT BY RAIL AND ROAD IN SWEDEN [Fuaerrgodstransporter med Jaernvaeg och Landsvaeg inom Sverige]

The study is based on a proposal from the Swedish state railways (SJ) to investigate changes of the total cost at variations in consignment size and annual quantity as well as changes of transport engineering. The scope has however been expanded so that it presents a methodology in the form of a flow chart that can be used for the dimensioning of long distance transport by rail and on the road. It is divided into six steps. In step 1 the aim is to determine the preliminary size of the handling unit and the number of units per consignment. In step 2 the planning of rail transport is framed and in step 3 that of road transport. In step 4 the transport cost for goods vehicles is estimated and in 5 the cost is calculated according to the tariffs of SK and ASG (two of Sweden's major hauling contractors). In step 6 SJ presents its cost for rail transport and finally quotes a price to the transport customer. The methodology was applied in two case studies; one with and one without

industrial tracks. In both cases the importance of suitable consignment size and the interaction between handling unit and cargo space was stressed. Furthermore transport should be coordinated so that empty return transport is avoided. [Swedish]

Carlsson, Y Thelander, L  
Lund University of Technology, Sweden Monograph TMTP-5107, 1979, 175p, Figs., Tabs., Photos., Refs., Apps.

ACKNOWLEDGMENT: TRRL (IRRD 249130), National Swedish Road & Traffic Research Institute

ORDER FROM: Lund University of Technology, Sweden, Institutionen foer Transportteknik, Fack, Lund, Sweden

## 22 322784

### LOST, DAMAGED AND ASTRAY FREIGHT SHIPMENTS: SOME EXPLANATORY FACTORS

A key factor in selecting a freight service is loss and damage experience. This article reports on a study of shipper-controlled variables which affect lost, damaged and astray shipments. Variables examined were number of pieces per shipment, interline movement, mean transit time, and distance. Rail carload, truckload, less truckload (LTL) and air freight shipments were analyzed. It was found that interlining increases probability of L&D for LTL, truckload and air freight shipments, and of astray shipments of LTL. For LTL and air freight, increase in number of pieces in a shipment increases probability of L&D. Truckload and LTL show a direct relation between transit time and L&D incidence. Air freight and carload rail shipments are more likely to incur abnormal delay during winter months.

Piercy, JE (John Carroll University) *Transportation Journal* Vol. 19 No. 4, 1980, pp 33-37, 3 Tab.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

DOTL JC

## 22 322800

### FARMERS' PERCEPTIONS: THE EFFECT OF PRAIRIE GRAIN ELEVATOR CONFIGURATION ON EFFICIENCY AND MARKET PERFORMANCE

Grain transportation in western Canada is in transition as rail branch lines are abandoned, elevators consolidated, and new port facilities put into operation. Study indicates farmers' perceptions of the value of competition in a market which is highly regulated with government fixing rail and elevator tariffs, establishing marketing quotas and quality standards, and in other ways involving itself in the distribution process. It is found that farmers believe that elevator competition is so important that they are willing to pay some added transport costs to preserve some competition among elevator operators and thus assure improved service.

Devine, DG Kulshreshtha, SN (Saskatchewan University, Canada) *Logistics and Transportation Review* Vol. 16 No. 2, 1980, pp 151-166, 5 Tab., 19 Ref., 1 App.

ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

DOTL JC

## 22 322802

### WEIGH-IN-MOTION SYSTEM INCREASES UNIT TRAIN LOADINGS

A combination of track scales and a microprocessor are used in a loading/weighing system installed at a British Columbia coal mine to assure uniform loads in unit-train gondolas handled by Canadian Pacific. The Loadweigh system consists of two track scales at the loading bin or silo which determine increasing lading weight so a computer can predict when the bin/silo gates must be closed. The process speeds train loading and assures the full cube of cars is used but that they are not overloaded.

*Railway Age* Vol. 181 No. 18, Sept. 1980, pp 28-29, 1 Phot.

ORDER FROM: ESL

DOTL JC

## 22 322910

### A DISAGGREGATE FILE OF COMMODITY ATTRIBUTES

This study covers over 1200 specific commodities which have been chosen on the basis of how well they represent the universe of commodities that move in commerce. These 1200 selected commodities are listed in decimal



hierarchy by industry and sub-industry. Each commodity is described by truck and rail commodity identification numbers and description. Attributes listed for each commodity are: plausible packing types, LTL class, TL class, minimum weight for truckload, density, value per pound, five year price change, probable LTL packing, probable TL packing, hazardous material symbol, special handling requirements, and shelf life. A partial STCC-SIC bridge is also included. The text describes the attributes and explains how they were estimated. This study is designed for use both as a shelf reference and as a data input for modelling. A magnetic tape of this data can be obtained at cost from the Center.

Kuttner, WS

Massachusetts Institute of Technology, Office of the Secretary of Transportation CTS 79-12, Aug. 1979, 171p, 2 Tab., 12 Ref.

Contract DOT-OS-70006

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

## 22 322954

### STANDARDIZE OR NOT TO STANDARDIZE: THE PROS AND CONS OF STANDARDIZED DESIGNS FOR CASKS AND CASK TRANSPORT SYSTEMS

There are many different cask designs that have been approved, built, and used over the years. Some special-use vehicles have been built. In the US, there are now over a dozen current use casks. With a sharp increase in the number of spent fuel shipments coming up in the next decade, and the beginning of high-level waste shipments in the late 1980's, there could be a proliferation of cask and transport vehicle designs. But is this a good idea? Should there be more casks of fewer designs, or are custom-designed casks and vehicles a better way to go? This paper examines the advantages and disadvantages of standardized designs for casks and cask transport systems. Factors of safety, economics, efficiency, and public acceptance are considered. Examples of other transport hardware standardization on reactor and processing plant design and operations are examined, as well as the effects of plant standardization on the transport system. This is a chicken and egg situation, and will require close cooperation between designers of transport system hardware and plant hardware.

From 5, symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 7, 1978. CONF-780506-(VOL. 1).

Brobst, WA Chais, M

Department of Energy 1978, pp 17-27

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Department of Energy, 1000 Independence Avenue, SW, Washington, D.C., 20585

## 22 322970

### HIGH SPEED RAIL--TO BARGE COAL TRANSFER TERMINAL

Minimizing the costs of transporting western coals has led to the use of long haul, large capacity unit trains to bring the coal east and large integrated unit tows to deliver it to consumers along the Inland Waterway System and Gulf Coast. Federal Barge Line's new high speed terminal at Cora, Illinois will be a key link between unit trains and unit tows. Arriving unit trains of 11,000 tons can be loaded at rates up to 5700 tons per hour. A large storage capacity will act as buffer preventing delays to either trains or tows. This paper discusses the development of the Cora facility.

Ports '80, Special Conference, Norfolk, Virginia, May 19-21, 1980.

Schmitz, RH (Dravo Corporation); Benko, A Rogers, R  
American Society of Civil Engineers 1980, pp 148-162

ACKNOWLEDGMENT: EI

ORDER FROM: ASCE

## 22 322971

### APPLICATION OF POA TO TRANSSHIPMENT TERMINALS

Transshipment terminals, facilities which forward products from one transportation mode to another, are being more closely scrutinized as the key to cost reduction. A Purpose-Oriented Approach is the utilization of a deliberate and logical method. This method defines the terminal's purpose, analyzes the opportunity, and employs an implementation program. Examples of recent outstanding transshipment terminals are cited in fair detail. The terminals are defined as a Link, Warehouse, Distributor, or Processor. By determining their primary function, initial efforts are shown to resolve a variety of problems in a timely and logical manner. Analysis of

the opportunity focuses on total cost. The use of an implementation program is shown to reduce the risks normally attendant to construction projects. Application of a POA to Transshipment Terminals recognizes the significance of transportation.

Ports '80, Special Conference, Norfolk, Virginia, May 19-21, 1980.

Yu, AT (Orba Corporation); Mahr, D

American Society of Civil Engineers 1980, pp 126-147, 17 Ref.

ACKNOWLEDGMENT: EI

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## 22 324431

### CALCULATION OF PETROLEUM PRODUCT VOLUME REMAINING ON INTERNAL SURFACE OF RAILROAD TANK CAR CISTERN DURING ITS EMPTYING [Raschet ob'ema nefteprodukta, ostayushchegosya na vnutrennei poverkhnosti kotla zhelezodorozhnoi tsisterny pri ee oporozhnenii]

The formation of a residue in railroad tank cars after petroleum product discharge is considered taking account of the interaction between the processes of discharge of the petroleum product remaining in the film on the tank inner wall and the discharge of the bulk of the liquid. A solution of this problem is proposed and results of calculations of the volume of the petroleum product remaining in the film at the moment of completion of the discharge of the bulk of the petroleum product are presented. [Russian]

Lur'e, MV *Izvestia Vysshikh Uchebnykh Zavedenii Neft i Gaz* No. 12, 1979, pp 53-58

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

## 22 324435

### HOW SLURRY PIPE LINES COMPARE WITH UNIT RAIL TRANSPORTATION

The author compares the economics of coal slurry transport with rail transport for the railroad and slurry pipe line routes from Gillette and Jacobs Ranch area in Wyoming to White Bluff, Ark.

Aude, TC (Pipeline Systems Incorporated) *Pipe Line Industry* Vol. 52 No. 6, June 1980, p 47

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

## 22 324489

### MOVING WESTERN GRAIN

As Canada looks to an increase of 50 percent in export grain trade by 1985, government and industry are working to eliminate bottlenecks from prairie grain fields to ports. Improvements to meet the 1985 goal include investments in port facilities, expansion of the government-owned grain car fleet and repairs to railroad-owned cars, and appointment of a federal grain transportation coordinator to oversee the systems development and operation. The new federal agency, the Grain Transportation Authority, is also supervising an \$800-million, 10-year program to upgrade prairie branch lines. Information systems are being installed by provincial cooperative organizations to better control grain movements and marketing.

Article in both French and English.

Magwood, P *Transpo/80* Vol. 3 No. 4, 1980, pp 2-7, 5 Phot.

ORDER FROM: Transport Canada, Public Affairs, Ottawa, Ontario K1A 0N5, Canada

## 22 325461

### ANALYSIS OF BROKERAGE FEASIBILITY FOR UNIT-COAL-TRAIN SHIPMENTS TO THE MIDWEST

The purpose of this paper is to determine the feasibility of aggregating industrial and utility demands for coal and of serving the demands through a local brokerage operation to reduce transportation cost. This cost saving is associated with the economy of scale of unit-train shipments. The delivered price of western coal is calculated for local users in a given Midwest subregion based on current utility and industrial coal demands. The broker operation would consist of unit-train hauls from western mines, a receiving and storage terminal, local truck or rail transportation from the terminal to each user, and possible transshipment to distant waterfront users. The research focuses on the area of Green Bay-Kewaunee in Wisconsin. Applicability of this brokerage concept to other areas that receive western coal shipments is also discussed.

This paper appeared in Transportation Research Record No. 758, Surface

Freight: Rail, Truck, and Intermodal.

Knorr, R Vezaris, S Wilkie, K *Transportation Research Record* No. 758, 1980, pp 24-28, 1 Fig., 4 Tab., 3 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

22 325706

#### A COMPARISON OF RAILROAD COAL UNLOADING SYSTEMS

Three types of open-top cars for unit coal train service are discussed along with five types of unloading arrangements to determine optimal systems for different travel distances and tonnages. Geographic factors also have a role in what is essentially an economic analysis.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Slater, RA (Dravo Wellman Company)

PLM, Incorporated Conf Paper 1980, pp 61-75, 20 Fig., 1 Tab.

ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

22 325888

#### HIGH-GRADE WESTERN COAL GOES EAST

Western Slope Carbon, a subsidiary of Northwest Coal Corp., is meeting the terms of its first longterm coal contract with coal that travels from a mine in Colorado to Central Illinois Light Co. in Peoria, Ill., 1,350 miles away.

Jackson, D *Coal Age* Vol. 85 No. 6, June 1980, pp 62-67

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 326219

#### TRANSPORTATION OF RADIOACTIVE WASTES FROM NUCLEAR FUEL CYCLES

This paper discusses current and foreseen radioactive waste transportation systems as they apply to the INFCE Working Group 7 study. The types of wastes considered include spent fuel, which is treated as a waste in once-through fuel cycles; high-, medium-, and low-level waste; and gaseous waste. Regulatory classification of waste quantities and containers applicable to these classifications are discussed. Radioactive wastes are presently being transported in a safe and satisfactory manner. None of the INFCE candidate fuel cycles pose any extraordinary problems to future radioactive waste transportation and such transportation will not constitute a decisive factor in the choice of a preferred fuel cycle. (ERA citation 05:000252)

International nuclear fuel cycle evaluation conference, Vienna, Austria, 17 Sep 1979.

Sandia Laboratories, Department of Energy CONF-790957-1, Sept. 1979, 35p

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

SAND-79-1886C

23 313630

## PROCEEDINGS OF THE UMTA R AND D PRIORITIES CONFERENCE (3RD) HELD AT CAMBRIDGE, MASSACHUSETTS ON NOVEMBER 16-17, 1978. VOLUME I. PROCEEDINGS OF GENERAL SESSIONS AND SUMMARIZED REPORTS OF WORKSHOPS

This is a compilation of material that was presented at the Third Urban Mass Transportation Administration Research and Development Priorities Conference. It contains proceedings of the General Sessions and summarized reports of the eight Workshop Sessions as well as a listing of conference participants.

See also Volume 2, PB-300987, and report dated March 77, PB-266158.

American Public Transit Association, Urban Mass Transportation Administration, (UMTA-DC-06-0157) UMTA-DC-06-0157-79-1, Nov. 1978, 71p

Contract DOT-UT-70026

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-161532

23 314331

## DEMANDS AND NEEDS OF FUTURE TRANSPORTATION: SURFACE TRANSPORTATION, 1964-FEBRUARY, 1980 (CITATIONS FROM THE NTIS DATA BASE)

This bibliography is divided into four sections, Urban, Rail, Marine, and General studies. The urban transportation section contains 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 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 460 abstracts, 30 of which are new entries to the previous edition.)

Kenton, E  
National Technical Information Service June 1980, 458p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-811300

23 314435

## EXECUTIVE REPORT: MEASURING THE INFLUENCE OF SUBSIDIES ON TRANSIT EFFICIENCY AND EFFECTIVENESS

The research is devoted to model development and data analysis in an effort to identify relationships between subsidies and transit performance. The theory underlying the determinants of the relationships is developed, and a justification is presented for the efficiency and effectiveness indicators to be tested. Each indicator, serving as the dependent variable, is regressed on relevant control variables, and on subsidies classified by source, use and control. For the sample of 55 observations from 1975-76, current levels of subsidies have increased riders per capita by 93 percent and expenses per vehicle hour by 9 percent over what they would have been if no subsidies had been provided. Subsidies have minor and generally insignificant effects on the six efficiency indicators, but state and local operating subsidies have significantly favorable impacts on the one effectiveness measure, riders per capita, resulting in increases of one to five riders for each dollar of subsidy.

See also PB80-189269. Prepared in cooperation with Indiana Univ. Northwest, Gary.

Barnum, DT Gleason, JM  
Nebraska University, Omaha, Urban Mass Transportation Administration  
Final Rpt. UMTA-NE-11-0002-FER, Nov. 1979, 25p

Grant DOT-UMTA-NE-11-0002

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-189251

23 314436

## MEASURING THE INFLUENCE OF SUBSIDIES ON TRANSIT EFFICIENCY AND EFFECTIVENESS

The report develops a procedure for measuring the impact of subsidies on transit performance, and implements the procedure using a 1975-76 sample to empirically test for the influence of subsidization.

See also PB80-189251. Prepared in cooperation with Indiana Univ. Northwest, Gary.

Barnum, DT Gleason, JM  
Nebraska University, Omaha, Urban Mass Transportation Administration  
Final Rpt. UMTA-NE-11-0002-F, June 1979, 149p

Grant DOT-UMTA-NE-11-0002

ACKNOWLEDGMENT: NTIS  
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PB80-189269

23 315330

## PASSENGER TRANSPORTATION IN THE YEAR 2000

Cost-and energy-efficiency will be an increasingly important factor in passenger transportation during the next few years. For example, the Amtrak intercity rail passenger system has proved to be inefficient compared to bus service over all and should be pruned and limited to those densely populated regions, such as the Northeastern corridor where it would be most cost effective. In the meantime, bus travel will be at a disadvantage due to the subsidy of rail transportation and will continue to lose ridership. This could be offset however, by increased fuel costs making private automobile travel less desirable. Due to decreased rates of economic growth, the emphasis of economic efficiency also obtains in the airline industry (Aviation users have demonstrated that low fares are more important to them than technological virtuosity). The latest models of aircraft tend to concentrate on more economical operation, improved energy efficiency, and reduced noise levels. As in the case with intercity travel, it is the author's opinion that local public transit planners should de-emphasize capital-intensive rail systems in favor of bus systems, particularly in low density suburbs which would also be more amenable to demand-responsive rather than fixed-route system.

This paper appeared in Transportation Research Board Special Report No. 189: State Transportation Issues and Actions.

Mulvey, FP (Northeastern University) *Transportation Research Board Special Report* No. 189, 1980, pp 67-76, 1 Tab., 22 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

23 316365

## DETERMINING MODAL CHOICE AND STATION CHOICE FOR A RAIL TRANSIT LINE

This paper considers the problem of predicting station choice and modal choice for composite mode trips that involve a trip by private car to a rail transit station and the continuation of the trip to the final destination by a rail transit mode. The choice between car and transit, and between park'n ride and kiss'n ride are both taken into account. One of the models presented takes explicitly into account traffic congestion. The methodology proposed relies on entropy maximization with inequality constraints related to parking capacities at the rail transit stations. The numerical application of one of the models to the Lindenwold high speed line is reported.

Los, M  
Montreal University, Canada Monograph No. 85, May 1978, 10p, 1 Fig., 1 Tab., 30 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 247234), Roads and Transportation Association of Canada  
ORDER FROM: Montreal University, Canada, P.O. Box 6128, Station A, Montreal, Quebec, Canada

23 318170

## PREDICTING AUTOMATED GUIDEWAY TRANSIT SYSTEM STATION SECURITY REQUIREMENTS

This study addresses the issues of personal security on Automated Guideway Transit (AGT) Systems, as they might be deployed in typical urban residential and non-residential settings. Based upon a literature review, it outlines basic characteristics of existing transit crime; compares station design concepts for AGT and conventional rail transit; reviews the key

environmental characteristics of AGT stations which may influence crime potential; inventories both existing and proposed countermeasures for transit crime reduction; identifies additional neighborhood resources which might be mobilized as countermeasures; reviews available techniques for predicting transit crime; and reviews techniques available for both predicting transit crime and assessing countermeasure effectiveness and offers recommendations for analysis strategies to be employed in local AGT studies. Traditional as well as innovative analysis techniques are covered. This report recommends a general approach for AGT station security requirements analysis which can be used by localities in site-specific AGT planning and engineering studies. This report provides a list of references as well as an annotated bibliography.

Ray, C Stuart, D Thomson, D Rouse, V Botts, J  
Rouse (WV) Associates Limited, Transportation Systems Center, Urban  
Mass Transportation Administration Final Rpt. DOT-TSC-UM-  
TA-80-5, Mar. 1980, 148p

Contract DOT-TSC-1454

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-194244

### 23 318182

#### SELF-SUSTAINING PUBLIC TRANSPORTATION SERVICES. VOLUME I. GUIDELINES FOR IMPLEMENTATION

These guidelines are based on examination of three self-supporting, or nearly self-supporting, public transportation services. The three systems studied were: the express bus routes operated wholly within the City of New York, the Chicago and North Western Railway's suburban service, and the PATCO Hi-Speed Line from Philadelphia to Lindenwold, New Jersey.

See also Volume 2, PB80-196157.

Morlok, EK Viton, PA  
Pennsylvania University, Philadelphia, Urban Mass Transportation Admin-  
istration Final Rpt. UMTA-PA-11-0017-80-1, Nov. 1979, 42p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-196140

### 23 318183

#### SELF-SUSTAINING PUBLIC TRANSPORTATION SERVICES. VOLUME II. TECHNICAL REPORT

The study examines three systems of urban transportation services which are self-sustaining (cover at least operating costs from the farebox). The three systems selected for the study are: (1) the Philadelphia-Lindenwold Hi-Speed Line, a rail rapid transit line operated by the Port Authority Transit Corporation (PATCO); (2) the express bus services in the City of New York, with routes operated by both the Metropolitan Transit Authority as well as private bus companies; and (3) the suburban railroad service in the Chicago metropolitan area of the Chicago and Northwestern Transportation Company (formerly C&NW Railway). These services are characterized by high fares; high service quality including a high probability of obtaining a seat and attention to consumer comfort and safety; travel times comparable to those on alternative modes, including the private car; service between residential areas and CBDs; market areas composed primarily of middle-to upper-income inhabitants; and costs not necessarily lower than comparable service by other operators. All three, until recently, have covered at least operating costs from the farebox. That two of them no longer do so is attributable to explicit policy decisions, and not to a failure in the viability of the service. The research concludes that although self-sustaining services are clearly appropriate only for certain markets, within those markets they have potential as a means of relieving the increasing scale of transit deficits.

See also Volume 1, PB80-196140.

Morlok, EK Viton, PA Sudalaimuthu, P Waldo, J Hessami, MS  
Pennsylvania University, Philadelphia, Urban Mass Transportation Admin-  
istration Final Rpt. UMTA-PA-11-0017-80-2, Nov. 1979, 239p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-196157

### 23 318430

#### A REPORT ON LIGHT RAIL TRANSIT: SURFACE OPERATIONS

This report recognizes the fact that the high costs of segregated fixed-guide-way transit have dampened LRT's popularity. As a result, the Transporta-

tion Research Board (TRB) and UMTA decided to conduct an examination of the obstacles to lower-cost surface configurations. Toward this end, a by-invitation-only seminar was convened in Washington, DC, on December 5-6, 1978. Its objective was to trace specific problems and to propose where effort toward their solution should be most effectively directed. These problems were expressed as a set of issues that served to focus thought and guide proceedings. This report contains three background papers as well as the summary of discussions on the impact of alignment options, traffic-engineering requirements, safety requirements, safety requirements for installation and operation requirements for passenger stop locations, intermodal interface, fare-collection options for surface operation, and future actions.

Transportation Research Board, Urban Mass Transportation  
Administration, (UMTA-DC-06-0216) Final Rpt. UMTA-DC-06-  
0216-80-1, Apr. 1980, 31p

Contract DOT-UT-80040

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-197700

### 23 319375

#### ESTABLISHING PRIORITIES FOR THE LOCATION OF TRANSIT STATIONS FOR DEVELOPMENT PURPOSES (ABRIDGMENT)

The feasibility of an objective approach for prioritizing transit station locations for development purposes based on socioeconomic and land use indicators is examined. The Detroit metropolitan area was used as the experimental site for such feasibility testing. Two priority ranking methodologies were developed based on the provisions of the rating and ranking methods. Station development potential was identified by a set of socioeconomic and land use indicators, and the viewpoints of local professionals were solicited in assessing the relative importance of these indicators. Next, the relative rankings for 37 proposed transit stations on two travel corridors were developed by using the indicators and the viewpoints of local professionals. The results suggest that it is possible to prioritize station locations for joint development based on selected socioeconomic and land use indicators. The results also suggest that the station ranks obtained by the two methods are not likely to be affected by input solicited from local professionals. The procedures developed were found to be sensitive to the selection of the indicators. (Author)

This paper appeared in TRB Research Record No. 747, Economic and Social Aspects of Transportation.

Arbogast, RG Khasnabis, S Opiela, KS *Transportation Research Re-  
cord* No. 747, 1980, pp 1-4, 1 Tab., 8 Ref.

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DOTL JC

### 23 319560

#### SUBSIDISATION OF URBAN PUBLIC TRANSPORT

Because of the general trend of increasing costs of public transport operation and higher subsidies (in some cases accompanied by falling patronage) the ECMT initiated a study of subsidisation and sought the help of TRRL. The study, which involved 18 countries, was concerned with the aims of subsidy, the sources and conditions attached to subsidy, trends in subsidies and the effect of subsidies on patronage, fares, service levels, costs and productivity. The qualitative information concerning the aims of subsidy was analysed in relation to the likelihood of achieving such aims, with particular reference to current experience of attempts to switch car drivers to public transport. The quantitative information on trends referred to the countries as a whole and covered the period 1965 to 1977; these data were supplemented by data from 59 cities in 7 countries collected in the course of a TRRL sponsored study of travel demand factors. The relationships between patronage and fares and service levels, and between subsidies and various operating factors, including costs and productivity, were studied using regression analysis and the general conclusion reached was that although the major part of the subsidy paid was reflected in reduced fares and improved service levels there may well have been some leakage into higher unit costs and manning levels. (a) (TRRL)

Bly, PH Webster, FV Pounds, S  
Transport and Road Research Laboratory, (0305-1315) Monograph  
TRRL Supl Rpt SR 541, 1980, 43p, 9 Fig., 9 Tab., 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 247079)

ORDER FROM: TRRL



23 319586

## WORKABILITY OF FLOWING CONCRETE

By using the two-point test for workability, the effect of concentration of superplasticizing admixture upon workability has been found to be independent of the types of admixture and cement. Differences in the effects of proprietary admixtures are due to their different solids contents. The yield value of concrete decreases to a minimum, beyond which further additions of admixture promote segregation. Loss of workability is not necessarily more rapid in flowing concrete, and re-dosing enables workability to be maintained for more than 160 minutes without detriment to the hardened strength. The melamine formaldehyde admixture caused more rapid workability loss than the naphthalene formaldehyde admixture tested, but a specific interaction between the former and a cement of low c3a/so4 ratio was found. An acceptance criterion for flowing concrete is proposed. (a)

Banfill, PFG *Magazine of Concrete Research* Vol. 32 No. 110, Mar. 1980, pp 17-27, 6 Fig., 5 Tab., 14 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 247552)

23 319640

## INTERMODAL TRANSPORTATION GARAGE FACILITY

A regional rapid transit terminal has been designed to integrate various transportation modes for the South Braintree Extension of the Massachusetts Bay Transportation Authority. The South Quincy Rapid Transit Station and Garage is one of the first, if not the first, transit facility constructed that has direct access to the converging point of three major highways. This facility provides long-term parking for 1,800 cars in two garages separated by a concourse, which is the focal point of all activity. The highway ramp system which connects to the garage has the capacity for handling 1,130 cars/hr in the peak commuter hours. A community parking area for 390 cars, with access only from the local streets, is provided for the exclusive use of local residents. The bus terminal permits the picking up or discharging of 12 buses simultaneously, accommodating both local transit buses and private buses from local communities. The design permits the addition of an extra platform.

Pacelli, AJ (Massachusetts Bay Transportation Authority) *ASCE Journal of Transportation Engineering* Vol. 106 No. 4, July 1980, pp 401-413, 1 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

23 319642

## HOW EFFECTIVE HAS URBAN TRANSPORTATION PLANNING BEEN?

The problems of how to plan effectively, where should the emphasis be placed, how may public participation be integrated, and what will be necessary to coordinate the efforts of the various planning organizations as the future challenges of planning are discussed.

Hassell, JS *Traffic Quarterly* Vol. 34 No. 1, Jan. 1980, pp 5-20, 10 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

23 319643

## IS PART-TIME LABOR A CURE FOR TRANSIT DEFICITS?

This article examines the potential savings from part-time labor and concludes that part-time labor cannot make a substantial reduction in the size of the transit deficit. Also discussed are the factors responsible for producing transit deficits. It is concluded that broad social forces outside the control of the transit industry are the major factors.

Lave, CA (California University, Irvine) *Traffic Quarterly* Vol. 34 No. 1, Jan. 1980, pp 61-74, 16 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

23 319691

## URBAN TRANSPORT IN WESTERN EUROPE

This bibliography is selective and includes material on European cities excluding those in Britain or communist bloc countries. Many of the original items are in foreign languages but English abstracts are usually provided. The bibliography is arranged by country, with a general European section first. (TRRL)

Hamlyn, P

Greater London Council, (0 71681063 8) Bibliography 105, Dec. 1978, 35p, Refs.

ACKNOWLEDGMENT: TRRL (IRRD 248122)

ORDER FROM: Greater London Council, GLC Bookshop, County Hall, London SE1 7PB, England

23 319693

## THE TROLLEYBUS-CAN IT BE REINTRODUCED?

The authors examine the operating costs of trolley bus systems, in those parts of the world still using them, comparing them with those of a conventional diesel bus system. If the true costs of Soviet and Czechoslovak vehicles are taken in the context of political prices, the evidence suggests that running and maintenance costs for diesel and trolley buses are about the same. A 1979 survey revealed that over 2500 trolley buses are still in use, and the market potential has encouraged some manufacturers to review the possible modification of existing diesel designs. The reliability, quietness and cleanliness of trolley buses make them popular with the travelling public and they can operate efficiently in high-density traffic corridors, fed at terminals by diesel bus operation. Thyristor control and regenerative braking have reduced power-consumption from about 4.8 to 2.5 kwh per kilometre. With the price of fuel oil rising more rapidly than that of electricity, running costs tend to favour the trolley bus which has a greater flexibility than the tram. It is suggested that although the true value of the trolley bus can only be determined by demonstration projects, it could be a serious contender for future transport in the 1980's. (TRRL)

Andrist, J Rose, D (Polytechnic of Central London, England) *Electric Vehicle Developments* No. 6, June 1980, pp 12-13, 6 Tab., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 248462)

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

23 319701

## STUDIES IN A SELECTED CITY ON THE REALISATION OF AN INNER CITY FREIGHT TRANSPORT SYSTEM WHICH UTILIZES RAPID TRANSIT RAILWAYS

[Untersuchungen in einer ausgewählten gross-stadt zur realisierung eines innerstaedischen gueterversorgungssystems unter einbeziehung von stadtschnellbahnen]

An attempt was made, by means of a model, to show the possibilities of using an existing rapid railway in inner city freight transport. The example is the city area of Hamburg where two underground railway lines are being used to deliver about 529 tons of goods daily. It is necessary to fit this into dense passenger transport without disturbing operations. The existing underground railway stations cannot be used because they are used to capacity by passenger transport; this means that new structures are necessary. Control of operations is by electronic data processing. Special containers are used for the freight transport, and either subterranean transport or surface electric vehicles are used to transport the goods from the stations to the city shops. The total costs of this type of alternative delivery system are only a little higher than the costs of conventional lorry transport. This however implies complete transition from lorries to the rapid railway system. The particularly favourable conditions in Hamburg cannot be generally applied to the solution of similar problems in other towns. [German]

*Internationales Verkehrswesen* Vol. 31 No. 4, 1979, pp 195-197

ACKNOWLEDGMENT: TRRL (IRRD 311622), 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 319939

## JOINT DEVELOPMENT: MAKING THE REAL ESTATE-TRANSIT CONNECTION

This book, consisting of an overview of the potential and problems of developing real estate in conjunction with rapid transit stations and then seven case studies, identifies for public and private participants the financial, legal, organizational and operational aspects. In order for joint development to enhance economic development related to transit investments, deal making between public and private parties is a necessity. Even experienced practitioners can learn of new arrangements for transit-related property development. The case studies about Philadelphia, Washington, Montreal, Boston and Toronto are presented in a rather consistent manner with special issues and innovative features of each project being highlighted.

Urban Land Institute 1979, 216p, Photos.

ORDER FROM: Urban Land Institute, 1200 18th Street, NW, Washington, D.C., 20036

23 319966

#### HANNOVER PINPOINTS LIGHT RAIL OBJECTIVES

With the construction of tunnels in the city centre and reserved tracks in the suburbs, Hannover is turning its tram network into a light rail system.

Scheelchase, K *Railway Gazette International* Vol. 136 No. 4, Apr. 1980, pp 283-285, 1 Fig., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

23 319967

#### PLANNING AND BUILDING METROS IN 15 SOVIET CITIES

Most Soviet cities with populations over 1 million already possess or are building metros. Standardization and pooling of engineering skills and resources in planning, building operation are being achieved through central control by the Ministry of Railways.

Shelkov, BA *Railway Gazette International* Vol. 136 No. 4, Apr. 1980, pp 299-302, 1 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

23 319979

#### ELEVATORS AT RAILWAY AND S-BAHN STATIONS

As a contribution to greater objectivity in the discussion about elevators at main-line and rapid-transit railway stations, the author presents the results of an investigation into what groups of persons use elevators, what experience has been gained with elevators, what technical and other improvements are possible, and under what circumstances they can be used at non-staffed stations. The results can be seen as a challenge to the planners to integrate elevators into the station complex. It was found that elevators are used by all classes of persons, that negative experience relates only to relatively light usage where the elevators are in out-of-the-way places. New installations should be easily recognizable from a distance and should not be hidden behind stairways and other structures, so that travellers and others can see them immediately. Elevators can also be employed at non-staffed stations in cases where the latter have cable links with an operating control centre, emergency-power sets, etc. [German]

Fiedler, J *Eisenbahntechnische Rundschau* Vol. 29 No. 4, Apr. 1980, p 293

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

23 322016

#### SETTING THE TASKS FOR RAIL RAPID TRANSIT IN URBAN CONGLOMERATIONS [Aufgabenstellung fuer den Schienennahverkehr in Ballungsraeumen]

Trends in the development of suburban railroad traffic are reviewed. Various types of rail systems are considered to suit different conditions and different population centers. The rapid transit system is considered as an integrated whole. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortr., Hamburg, Germany, June 12-14, 1979.

Pampel, F *ETG-Fachberichte* No. 4, 1979, pp 169-178

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

23 322031

#### COORDINATION OF URBAN TRANSIT SERVICES: THE GERMAN MODEL

In the Federal Republic of Germany, the need for coordination and integration of transport services has been seen as a pre-condition to improving public transportation. A major step in this direction has been the institution of the Transport Federation (Verkehrsverbund). The paper discusses the operation of the Hamburg Transit Federation and considers a number of factors which have created a favorable climate for the development of public transportation in Germany.

Dunn, JA, Jr (Rutgers University, New Brunswick) *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 33-43, 27 Ref.

ACKNOWLEDGMENT: EI

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23 322035

#### SECOND GENERATION U. S. RAIL TRANSIT SYSTEMS: PROSPECTS AND PERILS

Commitments that have been made to construct a "second generation" of new rail systems in four urban areas-- Atlanta, Georgia, Baltimore, Maryland, Miami, Florida and Buffalo, New York are discussed. The authors emphasize the prospects and perils that lie ahead for these systems in the context of national and local expectations for rail transit and the experience of the first generation rail transit systems of San Francisco, California (BART) and Washington, D.C.

Skinner, RE, Jr (Voorhees (Alan M) and Associates, Incorporated);

Deen, TB *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 17-32, 8 Ref.

ACKNOWLEDGMENT: EI

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23 322036

#### ENHANCING THE DEVELOPMENTAL IMPACT OF RAIL TRANSIT

A number of forces currently at work in the United States that are fostering the rebirth of urban rail transportation are discussed. It is stressed that in order to maximize the beneficial economic and developmental impact of future rail investment, certain procedures and techniques must be employed in the planning, design, and implementation of rail systems. The paper offers a set of guidelines and principles for transportation and land use policy makers.

Priest, DE (Urban Land Institute) *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 45-55, 2 Ref.

ACKNOWLEDGMENT: EI

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23 322037

#### FEDERAL RAIL TRANSIT POLICY: RHETORIC OR REALITY?

Almost two years ago the U. S. Department of Transportation issued a formal statement of policy on rail transit. The aim of the policy was to articulate more clearly some of the basic principles and philosophy which would guide Federal participation in urban rail transit investment. The paper examines the principal tenets of the policy and assesses its influence on local rail transit development.

Orski, CK *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 57-65, 4 Ref.

ACKNOWLEDGMENT: EI

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23 322038

#### LIGHT RAIL TRANSIT IN THE UNITED STATES

The paper reviews recent LRT developments in four American cities, two of which have undertaken to rehabilitate and upgrade their existing surface street railway systems, and the other two have embarked upon construction of entirely new light rail systems.

Taylor, SF (Sanders and Thomas, Incorporated) *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 67-74

ACKNOWLEDGMENT: EI

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DOTL JC

23 322039

#### LIGHT RAIL TRANSIT IN CANADA

This paper describes current light rail transit planning and operation in Canada's major cities and smaller communities. There are ten urban areas in Canada with 250,000 or more people. Two of these have light rail systems in operation, three have lines under construction and nine others are planning LRT systems.

Sullivan, BE (Alberta Department of Economic Development) *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 75-82

ACKNOWLEDGMENT: EI  
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DOTL JC

23 322040

## RAIL TRANSIT CONSTRUCTION AROUND THE WORLD

The author describes current rail transit projects in different cities of Europe, Asia and South America.

2 Goldsack, PJ *Transportation (Netherlands)* Vol. 9 No. 1, Mar. 1980, pp 83-92

ACKNOWLEDGMENT: EI  
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23 322052

## MODERNIZATION WORK ON FRENCH NATIONAL RAILWAYS PONT-SAINT-MICHEL STATION [Travaux de renovation de la gare S.N.C.F. de Pont-Saint- Michel]

The article describes modernization of the station together with the solutions adopted to cope with increasing traffic which has resulted in various other problems connected with track layout, level, foundations and hydrology, as well as passenger movement. [French]

Couffin, M *Revue Generale des Chemins de Fer* Vol. 99 Feb. 1980, n.p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

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23 322235

## DEVELOPMENT OF YEAR-2000 ALTERNATIVE TRANSPORTATION PLANS FOR THE DELAWARE VALLEY REGION

This paper discusses the concept and methodology used to develop long-range alternative transportation plans for the Delaware Valley Region. Four year-2000 alternative plans, including the no-build alternative, were formulated for simulation and evaluation. After a comprehensive evaluation of these alternatives, one of them will be selected and modified to be the year-2000 transportation plan. The alternatives were developed to achieve a set of regional goals prepared to deal with transportation issues and problems. The regional development pattern, travel demand and system deficiencies, short-range plans and programs, financial resources, administrative and legal requirements, and governmental and citizen recommendations were the major criteria considered in the formulation of the alternative plans. The alternatives were developed through an open two-way communication process between the staff of the Delaware Valley Regional Planning Commission and the various governmental agencies and private citizens involved in transportation planning. This process, which resulted in economical, feasible, practical and implementable alternatives, could be applied successfully to any urban region in the country. (Author)

This paper appeared in Transportation Research Record No. 751, Transportation System Analysis and Planning 1980.

Zakaria, T *Transportation Research Record* No. 751, 1980, pp 44-49, 1 Fig., 1 Tab., 8 Ref.

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23 322238

## ANALYSIS OF INTERCITY TRAVEL MARKETS IN NEW YORK STATE (ABRIDGMENT)

This paper presents the results of an analysis of intercity travel market segments in New York State's Empire Corridor (New York City-Albany-Buffalo). The intercity travel data were obtained from a stratified random sample of Empire Corridor residents that was taken in the spring of 1979. The survey collected information on respondents' intercity travel habits and model awareness, familiarity, and accessibility. Detailed analyses were performed on the Empire Corridor nonbusiness travel market. Tables were developed to show the demographic distributions and mean trip rates of nontravelers, light travelers (one to five trips per year), and heavy travelers (more than five trips per year). A multivariate statistical procedure, automatic interaction detector, was used to attempt to uncover the variables that best explain the variation in trip making. The results indicate that

geographic stratum is the best travel segmentation variable. Other variables that have an important influence on intercity travel markets and concentrated in heavy travel corridors with Railroad Passenger Corporation (Amtrak) service (a measure of the information level of corridor residents). The variables collected in the survey had different effects on each geographic stratum, which supports the assumption that the intercity travel market is heterogeneous. (Author) services from urban and regional carriers into

This paper appeared in Transportation Research Record No. 751, Transportation System Analysis and Planning 1980.

Zerrillo, RJ Neveu, AJ *Transportation Research Record* No. 751, 1980, pp 62-65, 3 Tab., 5 Ref.

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23 322529

## SYMPOSIUM ON ADVANCED TECHNIQUES IN URBAN AND SUBURBAN RAILWAYS [Simposio sobre tecnicas avanzadas en los ferrocarriles urbanos y suburbanos]

This work in 3 volumes contains the papers presented at the AIT Symposium held in Madrid from 20 to 22 May 1980. The Symposium examined all present-day aspects of rail transport in towns and their suburbs: rolling stock; infrastructure construction, both permanent way and fixed installations; energy consumption; protection of the environment; and operation. [Spanish]

Asociacion de Investigacion del Transporte UIC Cat 89 0 1, May 1980, 825p, 24 Tab., 410 Phot., 64 Ref., 2 App.

ACKNOWLEDGMENT: International Union of Railways, BD

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

23 322530

## RAILWAY GAZETTE PUTS APT IN PERSPECTIVE

Sir Peter Parker, Chairman of British Railways Board, pays tribute to the engineers who transformed the vision of the Advanced Passenger Train into reality. The pre-production APTs will enter passenger service this summer, 150 years after the first inter-city railway was opened in Britain between Liverpool and Manchester. Ian Campbell, Vice-Chairman of British Railways Board, heralds the start of APT services between London and Glasgow in a record time of 4 h 10 min. He tells the APT story, and explains that major cuts in journey time will be made without heavy investment in track and signalling.

*Railway Gazette International* Vol. 136 No. 5, May 1980, pp 1-14, Photos.

ACKNOWLEDGMENT: International Union of Railways, BD

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23 322534

## AMTRAK STANDARD DEPOTS

While the majority of Amtrak passenger stations are rehabilitated versions of the facilities used by its predecessor railroads, it has developed five new standardized station designs of different sizes with each designed to be expandable to twice its original size. Specific stations in each category are described. Objectives of the Amtrak depot program are to improve passenger comfort; create a modern and uniform image; incorporate ability for expansion; and cost-effectiveness.

Proceedings of the Eighty-Fourth Annual Conference of the American Railway Bridge & Building Association held October 15-18, 1979, Atlanta, Georgia.

Michel, JN (Amtrak)

American Railway Bridge & Building Association Proceeding 1979, pp 50-59, 4 Phot.

ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

23 322547

## ESTIMATION OF ORIGIN-DESTINATION MATRICES FROM OBSERVED FLOWS: SIMPLE SYSTEMS

Many transport planning and management tasks require an estimate of the pattern of trip making represented in the form of an Origin-Destination Matrix. This report describes the theoretical foundation and the practical application of an estimation technique which utilizes only relatively easy

obtainable traffic counts. The technique is applied to several practical examples: flights between cities, freeway flows, a commuter rail line, a subway route and two urban streets. In each case, estimates are compared to observed flows in order to afford the reader an impression of the estimation accuracy.

Hauer, E Shin, BT

Toronto-York University Joint Program in Transp Res Rpt. 65, No Date, 62p

ORDER FROM: Toronto-York University Joint Program in Transp, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario M3J 1P3, Canada

### 23 322568

#### **TYNESIDE REPORT 8. PART 3: OPERATION**

The greatest innovation in the operation of the metro is that by using the Phillips Vetag micro-processor based control system, the driver can control his train as well as drive it. On setting a code, the train is automatically routed through the system, changing the points, clearing signals, and changing station indicators. Two transponders are mounted on each passenger car giving signals to trackside sensors through loops sited on the track between the rails. There are 41 unstaffed stations, under the supervision of a central station controller who can monitor stations, through a closed-circuit TV, and address passengers on a PA system. Trains maintain constant radio contact with the control centre. Each service will run at 10 minute intervals for most of the day, allowing 5 minute headways on most of the track, but this time is reduced to 2 1/2 minutes at peak periods in the centre. Automatic fare collection, similar to that used in Paris and Lyon, has been installed. Ticket machines have change-giving facilities but will not accept banknotes. A comprehensive public relations exercise has been carried out to publicise the system and to educate children into the potential dangers of the high-voltage overhead wires.

Haywood, PG Price, JH *Modern Tramway and Light Rail Transit* Vol. 43 No. 511, July 1980, pp 222-228, 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 248774)

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

### 23 322569

#### **SOME RESULTS OF STUDIES MADE FOLLOWING THE OPENING OF THE LYON AND MARSEILLE UNDERGROUND RAILWAYS**

This article summarises the principal results of before-and after studies into the effects of the opening of the Lyon and Marseille underground railways. Results are not presented in detail, but differences in the two systems, and significant trends are highlighted. The networks are different in their structure and usage. The Marseille system is more radial and has considerably less usage than that at Lyon. Results show that the underground railways have attracted the less "captive" sections of the population rather than those who used a different form of public transport before the opening. The pattern and purpose of journeys was roughly the same in both cases; many journeys by train were linked to buses at one end or the other. In both cities the percentage of journeys made with connections between different modes of transport has doubled. It is shown that, on the whole, the opening of a single main underground railway had a negligible effect on the usage of private cars. There was a short-term decrease in the use of cars in certain areas of Marseilles, but drivers who discontinued were replaced by other car users. Opinion surveys produced favourable responses from the general public who want the systems extended. This article was published in French under the title "Quelques resultats des etudes de suivi des ouvertures des Metros de Lyon et Marseille", in *tec*, 1979-11/12, no 37, 17-23.

Ferry, B

Transport and Road Research Laboratory Monograph TRRL Transl 2843, No Date, 11p, 6 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 248806)

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### 23 322785

#### **TRENDS AND CHOICES FOR INTERCITY PASSENGER TRANSPORTATION IN AN ERA OF RESOURCE STRINGENCY--A PROBLEM POSED**

Common-carrier rail and bus transportation represent technologies of proven worth for expansion in an age of resource shortage. They can provide

an alternative to the private auto for intercity travel and a substitute for air travel in dense corridors. Bus service, coordinated with major air and rail routes, can provide an augmented, resource-effective substitute for light-density air and rail routes. Industry structure of the rail and intercity bus operators, combined with extensive federal regulation, has discouraged development of coordinated service. The author suggests that solutions are possible.

Nupp, B *Transportation Journal* Vol. 19 No. 4, 1980, pp 48-52

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

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### 23 322787

#### **A MANUFACTURER'S VIEW OF THE TRANSIT MARKET**

With only one survivor among five firms that had produced transit cars in the U.S. in the past decade, the author observes that foreign competition did not drive U.S. firms out of the market but rather moved to fill the vacuum produced when U.S. carbuilders quit. While operators need stable manufacturers to produce reliable cars which can be supported throughout their entire life cycle, suppliers need also a market which they can afford to serve. Barriers to such a stable, profitable transit-car market include absence of a consistent policy at DOT and UMTA; the sealed, low-bid procurement policy which is required; the use of detailed specifications which inhibits designer innovation; and absence of uniformity among cars of various systems.

Schlemmer, CJ (General Electric Company) *Transit Journal* Vol. 6 No. 3, 1980, pp 5-12

ORDER FROM: American Public Transit Association, 1225 Connecticut Avenue, NW, Washington, D.C., 20036

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### 23 322799

#### **THE DIFFERENTIAL IMPACT OF RESIDENTIAL LOCATION ON CHOICE OF MODEL IN THE SAN FRANCISCO BAY AREA**

The effect on location of residence when different forms of public transport are available in an urban region was examined with reference to the San Francisco Bay region. A survey was made of new residents with their choice of location possibly being based on accessibility to the following modes: Bay Area Rapid Transit, Southern Pacific commuter trains, and bus. A model of modal choice was developed and conclusions of the study are listed.

McCarthy, PS (Purdue University) *Logistics and Transportation Review* Vol. 16 No. 1, 1980, pp 33-58, 2 Fig., 7 Tab., Refs.

ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

DOTL JC

### 23 322808

#### **URBAN PUBLIC TRANSPORT IN THE USSR [Les transports publics urbains en URSS]**

In the Soviet Union, the development and operation of public transport is carried out on the basis of general plans. For towns of more than 250000 inhabitants, the official organisations prepare schemes which determine the urban transport modes, the use of which will permit them to accomplish effectively the transport of passengers, the layout of lines, the distribution of different services, the order of urgency and the importance of the work involved in restructuring and modernising the existing systems. The standards which are applied to the drawing up of schemes are designed for local conditions, but they respect the general principles such as: journey to work times should not exceed 40 minutes, the rate of loading at rush hour should be limited to five or six passengers per sq M of free surface. The creation of underground railways, trams, buses, trolley buses should be a function of the size of the towns. A brief description of automatic operation and of rolling stock is provided. [French]

*Union Internationale des Transports Publics, Revue* Vol. 27 No. 1, Jan. 1978, pp 25-29, 6 Tab., 6 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109206)

ORDER FROM: International Union of Public Transport, 19 Avenue de l'Uruguay, Brussels B-1050, Belgium

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23 322810

## THE PARK-AND-RIDE CORRIDOR STUDY [De corridorstudie parkeer-en-reis]

From Amsterdam a major railway line leads north into the province of North-Holland. Along this line some suburbs are situated. The authors report on a study which was carried out in 1979 by means of counts and interviews among commuters in this corridor. They are particularly interested in commuters who for their home-work trips can choose between car and train. Some conclusions are as follows: many employees are free to choose and this group already often takes the train; a quarter of the non-captive train commuters use park-or kiss-and-ride. The study leads to the conclusion that parts of major cities outside the CBD area should also be serviced by rail. [Dutch]

Baanders, A Vannders, A *Verkeerskunde* Vol. 31 No: 7, July 1980, pp 347-350, 1 Fig., 5 Phot., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249328), Institute for Road Safety Research

ORDER FROM: Dutch Touring Club ANWB, Wassenaarseweg 220, Box 2200, The Hague, Netherlands

23 322812

## TRAVELLING TO WORK. REPORT OF THE WORKING PARTY SPONSORED BY THE CITY OF WESTMINSTER CHAMBER OF COMMERCE

The various aspects of the journey to work which give cause for concern are examined. They include the extent to which the commuter is captive, the standard of service provided by the transport authorities, the gradually diminishing supply of suitable workers ready to take employment in central London, decrease in freedom of movement, and advantages and disadvantages of car usage. The transport systems of Belgium, France, West Germany, the Netherlands, Norway, Sweden, Denmark, Japan and USA are compared to that of the United Kingdom. Data are presented on rises in the cost of travel in the UK, British rail, underground and bus services, rise in incomes, and changes in pattern of travel to work. Results are given of a survey conducted among those who use public transport to get to work. Recommendations are put forward.

Stevens, R  
City of Westminster Chamber of Commerce Monograph No Date, 74p, 7 Fig., 21 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 248859)

ORDER FROM: City of Westminster Chamber of Commerce, Mitre House, 177 Regent Street, London, England

23 322815

## ANALYSIS OF RAIL AND AIR PASSENGER FLOWS BETWEEN LONDON AND GLASGOW USING BOX-JENKINS METHODS

The Box-Jenkins statistical method has been used to analyse point-to-point time series data for air and rail passenger traffic on the London-Glasgow route. Attempts have been made to identify explanatory variables which describe changes in the various passenger flows through time, and the effects of interactions and of particular events (such as strikes) are explored. Comments are also made on the reliability and appropriateness of the time series as supplied by the operations (British Airways and British Rail). (a)

McLeod, G Everest, JT Paulley, NJ  
Transport and Road Research Laboratory, (0305-1315) Monograph TRRL SR524, 1980, 19p, 1 Fig., 4 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 249506)

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23 322820

## METHOD OF DECIDING THE OPTIMAL SPECIFICATIONS OF TRANSIT SYSTEMS

The paper discusses a planning method to decide the optimal specifications of transit systems which fulfill the requirements of service levels within several boundary conditions, when the particular urban settings are given. After the theoretical explanations of the model, a local urban center was selected and the method was applied to prove the usefulness of it under the existing urban conditions.

Ishii, T (Tokyo University, Japan); Tsukio, Y *Journal of Advanced Transportation* Vol. 13 No. 2, 1979, pp 19-43, 2 Ref.

ACKNOWLEDGMENT: EI

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23 322821

## TRAVEL TIME EVALUATION

The process of travel time evaluation which includes the entire process of identifying, measuring, and combining attributes to create a structure that can form a basis for assigning monetary value to the time saved in transportation is reviewed. Evaluation techniques are discussed with reference to business and non-business travel. Selected issues and problems are discussed. The article is intended to be interpretive review of the literature associated with the technology of travel time evaluation.

Vemuri, SR (University of North Iowa) *Journal of Advanced Transportation* Vol. 13 No. 2, 1979, pp 95-120, 35 Ref.

ACKNOWLEDGMENT: EI

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23 322822

## GUIDELINES FOR PUBLIC TRANSIT PLANNING FOR U. S. METROPOLITAN AREAS IN THE DECADE OF THE 1980'S

This paper suggests guidelines and raises issues concerning the suitability of various technologies and service concepts for meeting the transit needs of U. S. metropolitan areas in the decade of the 1980's. The paper begins with certain assumptions and conclusions that form the basis for suggested guidelines. These assumptions and conclusions were developed by projecting current trends for the ten year period.

Kieffer, JA *Journal of Advanced Transportation* Vol. 13 No. 3, 1979, pp 1-16

ACKNOWLEDGMENT: EI

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23 322834

## LIGHT-RAIL TRANSIT IN NORTH AMERICA: WHAT'S GOING ON?

An ITE informational report by Technical Council Committee 5C-5 organized to develop design guidelines for handling light-rail transit (LRT)-vehicular traffic situations is presented.

*ITE Journal* Vol. 50 No. 3, Mar. 1980, pp 31-37, 8 Ref.

ACKNOWLEDGMENT: EI

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23 322836

## OBJECTIVE, METHODOLOGY, AND LOGIC OF THE FEASIBILITY STUDY FOR THE H-BAHN IN ERLANGEN

The paper defines the aims of the feasibility study by setting precise questions to be answered by the study. The available investigation methods which are possible within the limits of budget law in the Federal Republic of Germany and which result in a grant of funds for investment to the City of Erlangen, are explained. A suitable method is chosen from alternatives and the reasons for this choice are described.

Ilgmann, G *Journal of Advanced Transportation* Summer Vol. 13 No. 2, 1979, pp 85-93, 4 Ref.

ACKNOWLEDGMENT: EI

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23 322840

## SIMULATION MODELING OF INTERMODAL FACILITIES IN THE DESIGN PROCESS

This paper discusses the application of UMTA's newly developed station simulation model (USS) to the transit station design process. The USS program is intended to be a design and evaluation tool to assist in developing alternative configurations for rapid transit stations. The design process described is a sequence of six phases leading to the successful resolution of a complex facility design problem. This report describes where USS can be effectively used in the design process to provide answers to key design questions.

Lutin, JM (Princeton University); Benz, GP *Journal of Advanced Transportation* Summer Vol. 13 No. 2, 1979, pp 45-64, 11 Ref.

ACKNOWLEDGMENT: EI

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23 322937

**EMCT. ROUND TABLE 47(HAMBURG, 25 AND 26 JUNE 1979). POSSIBILITIES OFFERED BY THE RAILWAYS IN THE URBAN ENVIRONMENT [CEMT. Table ronde 47 (Hambourg, 25 et 26 juin 1979). Possibilités offertes par les chemins de fer en milieu urbain]**

Report on the 47th Round Table on Transport Economics, held in Hamburg on 25 and 26 June 1979. This report contains 14 case studies on the cities of Amsterdam, Barcelona, Madrid, Brussels, Copenhagen, Hamburg, Lille, Liverpool, Milan, Munich, Naples, Newcastle, Oslo and Vienna, followed by a summary report on the Round Table discussions on the case studies presented. [French]

European Conference of Ministers of Transport UIC Cat. 01 0 6, 1980, 418p, 6 Fig., 61 Tab., 106 Phot., 15 Ref., 2 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006

23 322984

**DEVELOPMENT AND TESTING OF AN INTERACTIVE TRANSIT STATION SIMULATION MODEL**

USS is a transit station simulation computer program developed for the Urban Mass Transportation Administration. The program is intended as a design and evaluation tool for transit planners and engineers, to assist in developing alternative configurations for rapid transit stations. In its final version, USS will become a part of UMTA's Urban Transportation Planning System (UTPS), a series of related computer programs which permit planners to simulate and model both supply and demand characteristics of urban transportation systems.

Lutin, JM (Princeton University)

American Federation of Info Processing Soc Press 1979, pp 936-941, 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: American Federation of Info Processing Soc Press, 210 Summit Avenue, Montvale, New Jersey, 07645

23 323233

**AIRPORT RAIL LINKS TAKE OFF**

As air travel continues to grow so does the problem of providing reliable and efficient transport between airports and the regions they serve. A number of cities have built airport rail links of one kind or another. While some have been successful, others have not—yet the number of links planned or under construction continues to rise. Good access to both in-town and airport stations is of prime importance, but high speeds are not as important as frequency. It is often better to plug the airport into the metro, so offering the widest possible spread of destinations, rather than providing a faster and perhaps more costly non-stop link to a city terminal which less than a third of air passengers will want to use.

Ashford, N *Railway Gazette International* Vol. 136 No. 7, July 1980, pp 594-597

ACKNOWLEDGMENT: British Railways

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23 323351

**INTEGRATION IS KEY TO SUCCESSFUL PUBLIC TRANSPORT**

The potential of the Tyne and Wear Metro rail system, the first phase of which is now in operation, lies in its integration with public transport such as bus services and parking facilities, as well as its ability to attract short distance travellers. A feature of the system is the increase in number of stations from 26 to 42 compared with the former suburban rail system. The service pattern has been based on a number of standard journeys with a 10 min headway. The metro system has been designed for future extension in three further phases. The ability of the system to negotiate 4% gradients and sharp curves will allow its penetration into areas where existing rail alignments are not sufficient. Stations are unmanned and are designed with emphasis on simplicity for ease of maintenance.

*Transport* Vol. 1 No. 3, July 1980, pp 65-67, 1 Fig., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 249627)

ORDER FROM: City Press Limited, Fairfax House, Colchester, Essex, England

23 323353

**YEAR 1990: TRANSIT RIDERSHIP FORECASTS**

This study developed transit ridership forecasts for the year 1990. To this end, a separate paradigm was calibrated for each of the twenty-four transit systems investigated. The models relate transit usage rate, measured in annual trips per capita, to a number of causal parameters, including: fare, level of service, gross personal income, and residential and transit network densities. Transit ridership was derived by multiplying the forecast transit usage rate by projected population size. Forecasts of ridership and ridership rates generated were based on a number of alternative fare and level of service policies postulated for the period 1976-1990. Conclusions outlining the impact of these operating policies of ridership and ridership rates are presented.

Prepared in Cooperation with Presage Research Limited.

Transport Canada Monograph NTP2204, Aug. 1979, 43p, 2 Fig., 11 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 249549), Roads and Transportation Association of Canada

ORDER FROM: Transport Canada, 1000 Sherbrooke Street, West, Surface Transport Admin, Montreal, Quebec H3A 2R3, Canada

23 323354

**URBAN TRANSIT OPERATIONS: AN INTRODUCTION**

The emphasis throughout the report is on bus transit operations particularly in the province of Ontario. However, several sections of the report will be generally applicable to all types of transit operations. In particular, the sections on monitoring, reporting and policy development should be of general interest.

Puccini, R

Ontario Ministry of Transportation & Communic, Can Monograph June 1979, 191p, 11 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 249539), Roads and Transportation Association of Canada

ORDER FROM: Ontario Ministry of Transportation & Communic, Can, 1201 Wilson Avenue, Downsview, Ontario M3M 1J8, Canada

23 323364

**ECONOMIC ASPECTS: REVIVAL OF RAIL SERVICES IN RURAL AREAS. 20 EXPERIMENTS, A FIRST EVALUATION [Vie économique: la relance des dessertes rurales. Vingt expériences, un premier bilan]**

Twenty experiments are being carried out in the hope of reviving rail services in rural areas. One action of this type is planned for each department. Some of these experiments are already two years old. The "atelier central d'études d'aménagement rural" (accar-central workshop for the planning of rural regions) has made a first assessment of the schemes operating. [French]

*Officiel des Transporteurs* No. 1056, Nov. 1978, pp 12-17, 6 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 105778), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Compagnie Generale de Developpement, 11 rue Godefroy-Cavaignac, 75011 Paris, France

23 323366

**THE USER AND THE SUBURBAN STATION ENVIRONMENT**

[L'usager et l'espace de la gare de banlieue]

Starting from the assumption that the way of life is part of the urban space through collective practices, the authors define the station as a transitional environment where the break takes place between the transport environment and the outside environment. The second part of the book describes the suburban station as part of the urban equipment. The authors investigate whether a transport policy can take into account the way of life of the suburban population in the design of stations which must deal with increasing traffic that is forever changing. [French]

Raymond, H Samie, A Trouarda, HSK

Laboratoire de Sciences Soc Appliquees a l'Urbain Monograph 1976, 272p, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (8006IR008E), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Laboratoire de Sciences Soc Appliquees a l'Urbain, Rue Maurice Chevalier 2A, Marnes La Coquette, France



23 324399

## COMPUTER-AIDED PLANNING AND DESIGNING SYSTEM FOR URBAN GUIDEWAY TRANSIT SYSTEMS--TRANSPLAN

The paper presents a computer-aided planning and designing system developed for urban transit systems. The system calculates the performance of a transit system, including automatic train operation, signal, traffic control, electrification, and track and vehicle functions, with a flexible dynamic simulator which was developed by the use of structural analysis and the hierarchical modeling concept.

Miyamoto, S Ihara, H Takaoka, T Ohshima, H Kariya, S *Hitachi Review* Vol. 29 No. 1, Feb. 1980, pp 1-6, 8 Ref.

ACKNOWLEDGMENT: EI

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23 324420

## STUDY OF AGGREGATE BI-MODAL URBAN TRAVEL SUPPLY, DEMAND AND NETWORK BEHAVIOR USING SIMULTANEOUS EQUATIONS WITH AUTOREGRESSIVE RESIDUALS

This paper emphasizes the existence of a difference among demand functions, which describe how consumers react, supply functions, which analyze the behavior of suppliers, and cost functions, which specify how prices and levels of service on a link or in a network vary with vehicle flows, ridership flows and other factors such as technology. Four aggregate demand, supply and cost models are formulated: each one regroups a subset of demand, supply and cost functions for two modes in Montreal, Quebec. A significant part of the analysis pertains to the study of a regulated transit supplier. The parameters of all models are estimated by at least two of four limited-information and full-information estimation techniques.

Transport Supply Models, Selected Papers from the International Symposium on Travel Supply Models, University of Montreal, Quebec, November 17-19, 1977.

Gaudry, MJI (Montreal University, Canada) *Transportation Research. Part B: Methodological* Vol. 14B No. 1-2, Mar. 1980, pp 29-58, 34 Ref.

ACKNOWLEDGMENT: EI

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23 324429

## SERVICE DEPENDABILITY MODEL FOR AN URBAN RAPID RAIL TRANSIT SYSTEM

A service dependability model is described in terms of passenger perceived probability of delay, from which reliability and maintainability requirements for an urban rapid rail transit system is analytically formulated. A feasible solution is obtained from a set of 3 non-linear equations and historical data and failure management techniques.

Large Eng Systems 2, Proceedings of the International Symposium on Large Eng Systems, 2nd, University of Waterloo, Ontario, May 15-16, 1978.

Yeh, YC (Canadair Services Limited)

Sandford Education Press 1978, pp 283-288, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Sandford Education Press, Waterloo, Ontario, Canada

23 324508

## PRAGMATIC STEPS TO SHORTER JOURNEY TIMES IN RAIL PASSENGER TRANSPORT

On the present DB system, "speed reserves" still exist for traction and rolling stock with best running characteristics. Except for the high-speed route sections, where speeds of up to 200 km/h are now already attained, such reserves are estimated to be about 10 to 15 per cent. The higher speeds are possible without using coach-body tilt control, yet allow present standards of passenger comfort to be maintained with only very minor technical outlay. Use of coach-body tilt control permits a further speed-up. In order to allow speed to be increased when trains pass non-stop through a relatively small number of stations, consideration is being given to the provision of special through tracks with extra superelevation where necessary for high-speed long-distance trains. The moderate speed increase recommended can probably be achieved without appreciable extra cost, and the expected gain in passengers numbers would help improve the DB's finances. [German]

Breimeier, R *Eisenbahntechnische Rundschau* Vol. 29 No. 7-8, July 1980, pp 541-546

ACKNOWLEDGMENT: British Railways

ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

23 324877

## POPULATION AND ECONOMIC DATA IN TRANSIT ANALYSIS

An investigation is made on the nature of impacts of public investment in a Light Rail Rapid Transit System in Buffalo, New York. In particular, the impact of the public investment is measured against population and employment declines that have occurred in the region in the last ten years. By assuming that the investment in rail is justified by more than the usual travel measures, associated redevelopment trends in the CBD, the focus of the transit development, are noted. While regional employment declines, service-oriented employment increases. This increase coupled with an increase in the number of women in the labor force, and increases in household income make private investment in the CBD more attractive. New construction, related to these trends (offices, hotels, retail space) has begun, reinforcing the transit decision.

Parker-Simon, K (State University of New York, Buffalo); Paaswell, RE *ASCE Journal of the Urban Plan and Develop Div* Vol. 106 No. 1, Nov. 1980, pp 43-58, 18 Ref.

ACKNOWLEDGMENT: EI

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23 324919

## NEW TYPE OF PASSENGER STATION--PASSENGER STATION COMPLEX

The area surrounding railway stations has become a center for traffic movement, where large numbers of individuals are drawn in or poured out, thereby exerting an influence on town development. For a number of years, JNR has been building a new type of station, which fulfils a variety of functions, especially that of a commercial and hotel complex.

Suzuki, T *Japanese Railway Engineering* Vol. 20 No. 1, 1980, pp 4-8, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

23 325283

## THE NEW HONG KONG UNDERGROUND RAILWAY

This paper describes some of the planning for the Hong Kong Mass Transit Railway from the operations aspect. Successful operation of a mass transit railway, especially one as busy as the MTR, requires comprehensive planning of policies and details, anticipation of every untoward incident, and development of appropriate recovery drill, training, discipline, coordination and high morale.

Cotton, AR (Mass Transit Railway Corporation) *Union Internationale des Transports Publics, Revue* Vol. 29 No. 2, 1980, pp 114-124, 2 Tab., 6 Ref.

ORDER FROM: International Union of Public Transport, Avenue de l'Uruguay 19, B-1050 Brussels, Belgium

23 325286

## STRATEGIC PLANNING AND THE RAILWAY PASSENGER MODE: A CRITIQUE

This study is a critique of three recent studies: "Southern Ontario Multi-modal Passenger Studies (S.O.M.P.S.)" by Transport Canada, "Inter-city Railway Transportation and Communication" by Transport 2000, and "Indirect Energy in Transportation" by the IBI group, each of which presents views and analyses relevant to the evaluation of strategic options for intercity passenger travel. The critique is addressed to methodological and multi-modal issues but with a focus on the rail mode. The SOMPS study team is commended for its evaluations of the air alternatives to Toronto International Airport expansion, but is criticized for its cursory treatment of the high-speed rail and bus alternatives. Some of the SOMPS cost and lead time assumptions are questioned and deviations of the report from consultant's background papers are noted. The Transport 2000 unit costs for the rail mode are examined. No systematic bias was noted, but the omission of infrastructure capital costs is questioned. Weaknesses of the input/output methodology proposed by IBI for the estimation of indirect energy consumption are illustrated, the usefulness of analyses that do not distinguish energy forms is questioned, and errors in the examples are noted.



English, GW Lake, RW Bunting, PM Law, CE Boon, CJ Schwiier, C  
Canadian Institute of Guided Ground Transport, Department of Transport, Canada, (PRO-023) CIGGT 80-10, Sept. 1980, 37p, 2 Fig., 6 Tab.  
Contract F1346  
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23 325756

#### THE CAR TRAIN FROM VIENNA TO INNSBRUCK FROM A TRAFFIC ENGINEERING VIEWPOINT [Der Autoreisezug Wien-Innsbruck aus Verkehrstechnischer sicht]

The use of a car train between Vienna and Innsbruck was planned by the Austrian federal motorway authorities for the 1979-80 winter season. In association with this expert traffic engineering opinion was sought on the volume of individual traffic on the parallel roads. Data obtained from 9 permanent automatic counting points for the period January 1976-November 1978 and from a traffic survey undertaken at the German-Austrian border were used to calculate the mean daily traffic volume, classify it according to winter, summer and spring volumes, and establish the percentage of tourist traffic. The study showed that in summer tourist traffic accounts for 70 percent of individual traffic, but in winter only 25 percent; it also showed that on the through routes in the west there is a much higher proportion of foreign traffic. [German]

Road Safety Board, Austria Monograph Mar. 1979, 50p, Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD 309487), Road Safety Board, Austria  
ORDER FROM: Road Safety Board, Austria, Oelzeltgasse 3, A-1030 Vienna, Austria

23 325871

#### BURY INTERCHANGE

A study is made of the Bury interchange, a terminal complex providing an all-weather passenger interchange between the British Rail electric railway service to Manchester and local bus services. Although the railway line to Bury was threatened with closure at one time, the area has since developed and now rail and bus services have been combined to give an overall 11% increase in journeys made. The interchange has an island platform long enough for six-car trains and also features a heated passenger waiting room. Stairs and an escalator link the platform to the bus area where there is room for nineteen buses as well as parking space. The success of the interchange terminal has proved that by providing ease of interchange between the two transport modes additional passengers will be attracted away from private transport.

Longworth, IJ *Modern Tramway and Light Rapid Transit* Vol. 43 No. 514, Oct. 1980, pp 333-337, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 250061)

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

23 325873

#### MODAL SPLIT OF THE COMMUTER TRAFFIC IN THE MAJOR URBANIZED AREAS IN JAPAN

The features of modal split of transportation systems were analysed in major cities in Japan where populations were over 100000. By means of cross-analysis and multiple regression analysis the authors attempt to develop the relation between modal split and city characteristics such as population, amount of commercial activity, production activity, and income per capita. (TRRL)

Nishimura, T Hino, Y Tsuji, T *Memoirs of the Faculty of Engineering* Vol. 20 Dec. 1979, pp 177-182, 4 Fig., 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 250298)

ORDER FROM: Osaka City University, Japan, 459 Sugimotocho, Sumiyoshi-ku, Osaka, Japan

23 325874

#### TYNESIDE TRAVEL GOES CONTINENTAL

The introduction of the Tyne & Wear Metro has shown the first UK attempt to introduce an upgraded public transport system using "supertram" technology and automatic fare collection. The network has required the construction of north-south and east-west tunnels under central Newcastle

and a tunnel section under central Gateshead linked by the Tyne bridge. A viaduct serving the Byker area of the city was also constructed. Key stations in the network are designed to provide multiple interchange facilities so that the same season ticket or travel pass can be used on both the metro and bus systems. A feature of the metro, due for completion in 1983, is that it can be readily extended at relatively low cost.

Alldovs, T *Municipal Journal* Aug. 1980, p 1014, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 250348)

ORDER FROM: Municipal Journal Limited, 178-202 Great Portland Street, London, England

23 325875

#### TYNE & WEAR METRO-FARE COLLECTION

Fare collection methods employed in the Tyne & Wear Metro are designed for maximum cost-efficient staffing levels. Each station is unmanned while trains only carry a single motorman. The metro system employs a simple ticketing procedure with only random inspection to prevent fraud. With this system a passenger carries a card ticket with a magnetically encoded stripe indicating zone, station number, fare and passenger category. The unmanned ticket barriers, based on Paris metro barriers, allow platform access once a ticket has been checked for validity and then returned. The integrated Tyne & Wear system allows a traveller to use the same ticket for a journey which includes metro and bus travel. Details are given of equipment used in the fare collection system and its method of operation.

Wyse, WJ *Modern Tramway and Light Rail Transit* Vol. 43 No. 515, Nov. 1980, pp 374-380, 2 Tab., 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 251010)

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

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23 325877

#### MIXED FORTUNES FOR METRO

Despite a small number of early mechanical problems the Tyne and Wear Metro light rail system is now said to be offering a popular and efficient service for its passengers. Such a form of light rail service is ideal for overcoming public transport problems of cities which are too small to warrant the consideration of a costly underground rail system. Although it was hoped that once the Tyne and Wear Metro was operating successfully, other similar schemes might follow, only Avon has so far commissioned a feasibility study.

*New Scientist* Vol. 87 No. 1220, Sept. 1980, p 912, 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 250062)

ORDER FROM: IPC Magazines Limited, King's Reach Tower, Stamford Street, London SE1 9LS, England

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23 325883

#### SAN DIEGO LIGHT RAIL STORY

The paper discusses the San Diego project, which afforded a unique opportunity for implementation of a transit system with a minimum of capital investment. This opportunity was presented with the acquisition of the San Diego & Arizona Eastern Railway. The total escalated capital cost for the project will be under 5 million per mile. This project represented a relatively low-risk investment strategy due to availability of right-of-way and the reliance on proven materials, equipment and techniques. The system will provide a more reliable and higher-speed service than other transit alternatives in the corridor. The project had a finite budget at the outset, therefore the necessity to build within the budget was mandatory.

Proceedings of the Special Conference-Broadening Horizons, Transp and Dev Around the Pacific, Honolulu, Hawaii, July 21-23, 1980.

Coil, JA

American Society of Civil Engineers 1980, pp 301-312

ACKNOWLEDGMENT: EI

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23 325917

**RAILWAY LINES. TECHNICO-ECONOMIC CONSIDERATIONS AS REGARDS THEIR CHARACTERISTICS** [Vias ferroviarias. Consideraciones de caracter tecnico-economico sobre sus caracteristicas]  
Following details of the main factors involved in establishing the capacity of a railway line, the author quantifies these factors and shows their interrelationship using the example of a Latin-American railway. [Spanish]  
See also Vol. 5 No. 18, April-June 1980 issue, pages 40-47.

Vittone, J *ALAF Revista* Vol. 5 No. 17, Jan. 1980, pp 39-50, 13 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion Latinoamericana de Ferrocarriles, Florida 783, P1, 1005 Buenos Aires, Argentina

23 326248

## CAMDEN COUNTY COORDINATED MASS TRANSPORTATION SYSTEMS STUDY. PHASE II

The 1970s set in motion a continuing transportation planning program that would provide an efficient and cost effective system of public transportation services for Camden County. Camden County initiated a systematic planning effort--the Coordinated Mass Transit Systems (CMTS) Study--to analyze the transportation needs of the county residents and subsequently to develop a transportation improvement program. Phase I of the CMTS study was completed in July 1977, and it focused on specific transportation issues such as an assessment of the quality of service; evaluation of public information programs; and the role of the county in public transportation. Phase II work was completed in June 1979. Phase II study, this report, focused on three areas: (1) feasibility of park-n-ride express bus service between the future PATCO Berlin Station site and the Lindenwold Station; (2) analysis of all paratransit services; and (3) analysis of all fixed-route transit services in the county. This report documents the evaluation steps and the recommendations of the CMTS Phase II study. It also contains an Executive Summary that highlights the principal conclusions and recommendations of both Phase I and Phase II study efforts. The CMTS Phase II study has recommended a specific implementable plan to improve mobility in Camden County. The recommendations developed during this study are summarized herein as well as the discussions of each of the three study areas. This study recommended that Camden County establish a program to improve coordination between services operated by municipalities, TNJ (Transport of New Jersey), PATCO, and Social Service Agencies.

See also Appendices, PB80-216203. Sponsored in part by Camden County Planning Board, NJ.

Simpson and Curtin, Incorporated, Urban Mass Transportation Administration, (UMTA-IT-09-0050) Final Rpt. UMTA-IT-09-0050-80-1, June 1980, 116p

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB80-216195

23 326249

## CAMDEN COUNTY COORDINATED MASS TRANSPORTATION SYSTEMS STUDY. PHASE II. APPENDICES A, B, C, AND D

The 1970s set in motion a continuing transportation planning program that would provide an efficient and cost effective system of public transportation services for Camden County. Camden County initiated a systematic planning effort--the Coordinated Mass Transit Systems (CMTS)--to analyze the transportation needs of the county residents and subsequently to develop a transportation improvement program. Phase I of the CMTS study was completed in July 1977, and it focused on specific transportation issues such as an assessment of the quality of service; evaluation of public information programs; and the role of the county in public transportation. Phase II work was completed in June 1979. Phase II study, this report, focused on three areas: (1) feasibility of park-n-ride express bus service between the future PATCO Berlin Station site and the Lindenwold Station; (2) analysis of all paratransit services; and (3) analysis of all fixed-route transit services in the county. This report documents the evaluation steps and the recommendations of the CMTS Phase II Study. It also contains an Executive Summary that highlights the principal conclusions and recommendations of both Phase I and Phase II study efforts.

See also PB80-216195. Sponsored in part by Camden County Planning Board, NJ.

Simpson and Curtin, Incorporated, Urban Mass Transportation Administration, (UMTA-IT-09-0050) Final Rpt. UMTA-IT-09-0050-80-2, June 1980, 371p

ACKNOWLEDGMENT: NTIS  
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23 329514

## PLANNING PROCEDURES FOR TRANSIT STATION SECURITY

The article discusses the principal issues in station security and describes a set of procedures for designing safe terminal areas. Environmental factors that influence both actual and perceived security are reviewed, and proposed crime countermeasures are identified and linked to security goals. A planning procedure is developed for designing transit stations for improved security.

Richards, LG (Virginia University); Hoel, LA *Traffic Quarterly* Vol. 34 No. 3, July 1980, pp 355-375, 19 Ref.

ACKNOWLEDGMENT: EI  
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23 329516

## DESIGN GUIDELINES FOR PARK-AND-RIDE LOTS

A list of guidelines is presented to aid in the development of park-and-ride site design. Included in these guidelines are considerations for streets leading to the lot, convenient movement by all modes within the lot, amenities for the passengers, environmental impacts of the facility, the use of proper design standards, and similar considerations for joint-use facilities. Local examples of park-and-ride sites are presented to illustrate how design principles outlined can be used in actual practice.

Compendium Technical Papers Annual Meeting of the Institute of Transportation Engineers, 49th, Toronto, Ontario, September 23-27, 1979.

Allen, DA (North Central Texas Council of Governments)  
Institute of Transportation Engineers Conf Paper 1979, pp 85-95, 17 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

23 329733

## EMCT. ROUND TABLE 47 (HAMBURG, 25 AND 26 JUNE 1979). SCOPE FOR RAILWAY TRANSPORT IN URBAN AREAS

A series of case studies of public transport in 14 European cities is followed by a summary of questionnaire answers given by the authors of the case studies. The cities did not include "agglomerations" of several million such as Paris and London with very special public transport problems but did include Amsterdam, Barcelona, Madrid, Brussels, Copenhagen, Hamburg, Lille, Liverpool, Milan, Munich, Naples, Newcastle, Oslo, and Vienna. Conclusions are drawn about the role of rail transit in urban areas and a number of general principles are developed concerning typological description of an urban district; volume of traffic and modal split; form and organization of public transport (fares, service, parking); financing and maintenance of vehicles; and economics (operating costs, fares policy, and subsidy).

European Conference of Ministers of Transport 1980, 375p, Figs., Tabs.

ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006  
DOTL HE11.E988

23 329939

## RAILBUS: A HYBRID SEEKS ITS NICHE

The two-axle Leyland Experimental Vehicle (LEV-2) has been introduced into revenue service between Concord, NH, and Lowell, MA, serving as a feeder for conventional commuter trains operating into Boston over the Boston and Maine. FRA is sponsoring service into a low-density area for one year as part of its passenger technology program. The vehicle, an elongated Leyland bus body mounted on a modified version of the two-axle underframe developed by British Railways for high-speed freight cars, is seen as a low cost means for providing local passenger services.

*Railway Age* Vol. 181 No. 23, Dec. 1980, pp 32-34

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23 329962

**PLANNING SURFACE PUBLIC TRANSPORT: THE CASE OF CARACAS** [Planificación de transporte público superficial: el caso de Caracas]

A wide summary is presented of the study of public transport in the city of Caracas, Venezuela, which has made possible the development of a series of methodologies for the evaluation of urban public transport systems. By means of a computer simulation of the existing transport system, and using models, an analysis has been made of the transport operations of the system. The models were calibrated and the operations evaluated. Results are presented of the passenger traffic assignments for different surface public transport systems, and an analysis is made of proposals for integrating the underground railway system with the surface system. The analysis of the operations makes it possible to isolate a series of schematic planning techniques for evaluating the characteristics of the system: structure of lines, speed of journeys, bus priority, speeds, demand and length of express lines, charts of the indices of behaviour of the network, results of detailed breakdown of seats, number of changes etc. The different stages of development of the projects which are presented for correcting the deficiencies in the service, are discussed. TRRL [Spanish]

Cajiao, J *Anales de Ingenieria* Vol. 136 No. 798, Apr. 1978, pp 43-51, 1 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 109619), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain

ORDER FROM: Sociedad Colombiana de Ingenieros, Carrera 4, No. 10-41, Bogota, Colombia

23 329971

**THE RAILWAY SERVICE TO THE NEW TOWN OF CERGY-PONTOISE** [La desserte ferroviaire de la ville nouvelle de Cergy-Pontoise]

To ensure transport services to the new town of Cergy-Pontoise the authorities adopted in 1974 the solution proposed by the SNCF: optimum use of existing lines so as to reduce the construction and cost of new infrastructures. Details are given of the alignment of the new line and of the new service which keeps pace with the development of the town and is integrated in the master plan for public transport in the Paris region. [French]

Unia, M *Transports* No. 244, July 1979, pp 299-301, 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 105499), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Editions Techniques et Economiques, 3, rue Soufflot, 75005 Paris, France

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24 318484

## EQUIPMENT OF USSR RAILWAYS

Illustrations and specifications are provided of equipment used by the Soviet Railway network. Included are electric and diesel locomotives, passenger and freight cars, track laying and maintenance equipment, automatic and remote control equipment, computer equipment, passenger station equipment, and freight handling equipment.

Text in Russian and English.

USSR Ministry of Railways 1976, 146p

ACKNOWLEDGMENT: NTIS

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PB80-200256

24 319673

## CANDID VIEW OF THE NORTHEAST CORRIDOR IMPROVEMENT PROJECT

The paper deals with the upgrading of the Northeast Corridor (NEC) rail system as the most comprehensive railroad program in the United States, and the Northeast Corridor Improvement Project (NECIP). Studies made concerning transportation problems in the NEC region and the implementation of the NECIP for solution of the problems are reviewed.

Caywood, JA (De Leuw, Cather and Company) *Traffic Quarterly* Vol. 34 No. 1, Jan. 1980, pp 45-59

ACKNOWLEDGMENT: EI

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24 319681

## A RAIL SYSTEM OPTIMIZATION MODEL FOR THE TRANSPORTATION OF COAL

The objective of this research was to develop a rail system optimization model which would serve two purposes: (1) to predict the future demand for coal movements on the existing rail system of a region in order to evaluate the system's capability of moving the required tonnage; and (2) to develop an optimal, multimodal coal shipping plan for the region which would minimize the cost and also efficiently utilize the existing facilities. The developed model consists of a Coal Allocation Submodel and a Railroad Network Submodel. The model was applied to the State of Indiana as a case study in order to investigate the state rail system's capacity for shipping coal to facilities in the state. With the projected coal flows and the assumed growth in non-coal freight shipments, the potential bottlenecks, the high volume links, as well as the low volume links in the network were identified. The results showed that under the high demand scenario the existing rail system was generally adequate to meet the demand till the year 2000. Abandonment of several lines or segments will cause serious congestion along parts of the system. Based upon an analysis of the regional transportation demands an optimal coal shipping plan was developed for the state. The study indicated that a consolidated network would significantly improve the efficiency in use of resources. It was recommended that the ConRail and solvent carriers in the state should, to the fullest extent practicable, share facilities and coordinate operations in order to make the rail mode economically viable and to support efficient competition.

Chang, C-J

Purdue University PhD Thesis Aug. 1979, 177p, 45 Fig., 29 Tab., 115 Ref., 3 App.

ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48106

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24 319699

## HOW BRITISH RAIL COMPARES WITH OTHER EUROPEAN SYSTEMS: 1: GOVERNMENT ATTITUDES, COMMERCIAL PERFORMANCE AND LABOUR PRODUCTIVITY

The study identifies differences in performance during 1977 between the railways of Britain, West Germany, Denmark, Sweden, Italy, Norway, Belgium, France and Finland. An attempt is made to separate the effects of geography, economic structure and government policy from those of operation and management. Perhaps the clearest conclusion from the study is the potential for improving British and Italian freight train crew productivity by abolishing guards and/or drivers assistants. Government attitudes and policies exercise a major influence on commercial operating and financial performance. It is clear that there is a close relationship

between fares and market-share-the lowest fares having the largest market. It appears that BR faces more severe competition from cars and buses than most of the railways studied. The study showed a close relationship between the rail share of the market and the commodity carried. Staff productivity comparisons are difficult because Sunday is included in the standard week on the continent, whereas in Britain, Sunday working is regarded as overtime. Over the years 1971 to 1976, although BR experienced falling traffic, a rapid reduction in the labour force has led to a modest rise in train-km per man.

*Modern Railways* Vol. 37 No. 381, June 1980, pp 252-256, 11 Tab., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 400240)

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24 319941

## THE DEVELOPMENT OF RAILWAYS IN THE WORLD. NEW LINES IN THE WORLD. LARGE-SCALE INTERNATIONAL RAILWAY PROJECTS [Le développement des chemins de fer dans le monde. Les lignes nouvelles dans le monde. Grands projets ferroviaires internationaux]

More than 10,000 km of new lines are at present under construction. The new lines fall into four categories, according to the objectives they are designed to meet: the creation or completion of a national rail network, the construction of special lines for transporting complete train loads of heavy raw materials, the extension of metropolitan or suburban passenger networks and the increase in capacity of main routes nearing saturation. For large scale projects many financial problems are involved, in spite of the advantages they hold for the future and the prospect of profit-earning, especially for long distance freight routes. The major projects are studied for both their advantages and profitability. [French]

Fontgalland, BH, de Wickham, SP *Transports* No. 246, Oct. 1979, pp 363-376, 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Editions Techniques et Economiques, 3, rue Soufflot, 75005 Paris, France

DOTL JC

24 319942

## PROBLEMS OF THE DEVELOPMENT OF EUROPEAN RAILWAYS [Probleme der Entwicklung der europaeischen Eisenbahn]

The energy shortage and concern for the environment have contributed to making the railway one of the most important modes of transport. The different scientific, technical and economic problems can only be resolved by united action within the Union of Railways, taking into account the interests of the Lander covering the Largest areas. In order to improve European railway traffic the tariff system for freight in transit must be improved, container forwarding times must be reduced, and the capacity of the railways will have to be increased. Eastern European countries will be called upon to take part in a modernization programme for Europe as a whole. [German]

*West-Ost-Journal* Vol. 12 No. 4-5, 1979, pp 45-46

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: West-Ost-Journal, Robertgasse 2, 1020 Vienna 2, Austria

24 319963

## RESEARCH IN AUSTRALIA ON THE RAILWAYS OF THE FUTURE

The article gives an account of the research conducted at the laboratories of the Broken Hill Property Company Limited (BHP) in Melbourne: development of new alloys for rails; study of truck movements, especially in curves; development of a driving simulator; study of the best metal cross ties. [French]

*Rail International* Vol. 11 No. 5, May 1980, pp 332-335, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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24 319964

## THE COLOMBIAN NATIONAL RAILWAYS, THEIR PRESENT AND THEIR FUTURE

The author, who is General Manager of the Colombian National Railways, gives a short description of his network (length of lines, traffic, rolling stock),

and stresses the need to implement a plan for renewal and modernization. He lists the priorities to be given to improvements so that the railway can play its part in the economic activity and progress of Colombia, in view of the present energy crisis.

Lopez Villa, SM de *Rail International* Vol. 11 No. 5, May 1980, pp 279-281

ACKNOWLEDGMENT: International Union of Railways, BD  
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#### 24 320294

##### RAILROAD REVIEW AND OUTLOOK

Discussed various factors affecting the railroad industry during the preceding year including the national economic situation, traffic trends, employment and wages, material prices, rates, fares, legislation etc., with statistical tables and charts, as well as the outlook for the current year.

Hardcopy.

Association of American Railroads Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (294)  
ORDER FROM: AAR

#### 24 320317

##### RAILROAD RETIREMENT BOARD OPERATIONS, STATISTICAL SUMMARY

Monthly benefit statistics, railroad retirement and unemployment insurance programs, also annual report.

Railroad Retirement Board Monthly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (317)  
ORDER FROM: Railroad Retirement Board, Bureau of Research, Chicago, Illinois, 60604

#### 24 320318

##### REPORT OF RAILROAD EMPLOYMENT, CLASS I LINE-HAUL RAILROADS, STATEMENT M-350

Report contains number of employees of Class I line haul railroads, with comparisons to the previous month and the same month of the previous year. Contains 2 tables: 1. Number of employees, 2. Indexes of employment.

Hardcopy.

Interstate Commerce Commission Monthly No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (318)  
ORDER FROM: Interstate Commerce Commission, Bureau of Accounts, Washington, D.C., 20423

#### 24 320720

##### AAR STATISTICS OF CLASS I RAILROADS IN THE U.S.

Eleven year comparison of Class I railroad data for the U.S. industry without individual corporate statistics identified. Report follows the basic format of the ICC's annual report form R-1 and includes financial, operating and traffic data for the Class I railroads representing 96 percent of the mileage and operating revenues of all U.S. line haul railroads. (Financial, operating statistics) The following data is shown for report year and 10 preceding years: 1) Property investment shareholders' equity, net working capital and operating income; 2) Total income, fixed and contingent charges, ordinary and net income, dividends and capital expenditures; 3) Revenues, expenses and income by primary ICC account-freight and passenger service; 4) Employees and their compensation; 5) Freight traffic by 35 principal commodity codes, including less-than-carload; 6) Cars of revenue freight loaded; 7) Locomotives 8) Freight-train cars; 9) Locomotive, train and car mileage; 10) Distribution of railway operating revenues; 11) Railway tax accruals; 12) Freight operating statistics; and 13) locomotive fuel consumed, average cost of fuel, rail and ties laid.

Hardcopy. Data are reported by individual Class I railroad operating companies to the ICC which prepares and issues summaries of these data.

Association of American Railroads Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (720)  
ORDER FROM: AAR

#### 24 320728

##### RANK OF CLASS I RAILROADS

Rankings of Class I carriers by: 1. Miles of A) Line and B) Track operated 2. Net investment 3. Operating revenue, total and freight 4. Income, Net railway operating and ordinary 5. Freight ton-miles 6. Locomotives and freight cars owned or leased 7. Number of employees.

Papercopy.

Association of American Railroads Annual No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (728)  
ORDER FROM: AAR

#### 24 320729

##### RAILROAD MILEAGE BY STATES

Total single track (Route) mileage operated by each U.S. Class I and Class II railroad by state. Switching and terminal companies (Class I and II), total track mileage shown by company by state. Mileages shown include road or tracks owned solely, jointly, leased or operated under trackage rights or other interrailroad agreements. (Operating statistics, facility location) Major data content: Data are required by (A) Class I line haul, (B) Class II line haul and (C) Switching and terminal railroads, displayed alphabetically by state, and alphabetically by railroad within the above classifications. Mileages shown for Class I, Class II and switching and terminal railroads indicate: A. Total miles of line operated by each company, B. Miles of line operated within each state, C. Percentage of total system miles within each state.

Hardcopy. Data supplied by individual railroad operating companies and is published every three years.

Association of American Railroads No Date, n.p.

ACKNOWLEDGMENT: Transportation Statistical Reference File, TSC (729)  
ORDER FROM: AAR

#### 24 322007

##### RAIL TRAFFIC-REASONABLE CHOICE FOR THE FUTURE [Schienenverkehr-Zukunft mit Vernunft]

The texts of 17 technical papers presented at the Conference organized by the Power Engineering Society of VDE, Association of the German Locomotive Industry, and German Association of Rolling Stock Builders at the Congress Centrum in Hamburg on June 12-14, 1979, are presented. The subjects dealt with concern for the problems of railroad traffic control, locomotive and rolling stock design, drive technology, power transmission, rapid transit. 17 papers are indexed separately. [German]

Schienenverkehr-Zukunft mit Vernunft, Fachvortr, Hamburg Germany, June 12-14, 1979.

ETG-Fachberichte No. 4, 1979, 279p

ACKNOWLEDGMENT: EI

ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

#### 24 322540

##### THE DELMARVA SHORT LINES: A NEW BREED

Two short lines, under common management, the Virginia and Maryland and the Maryland and Delaware, have been designated operators for former marginal Penn Central lines on the peninsula east of Chesapeake Bay. The role of the federal government in sustaining such operations is to end in 1981 when states and operators will be faced with decisions about the futures of not only these railroads but many others in the Northeast and Midwest. There are immediate operating and traffic problems for two lines and the states of Maryland and Virginia have policy decisions to make concerning their continued operation.

Kizzia, T *Railway Age* Vol. 181 No. 17, Sept. 1980, p 82, 2 Phot.

ORDER FROM: ESL

DOTL JC

#### 24 322555

##### THE TESTING OF RAILWAY EQUIPMENT ON TEST TRACKS AND EXPERIMENTAL SECTIONS OF LINE

Tests, which are necessary to develop new, improved railway equipment, require a considerable metrological and financial outlay. This is especially so if one wants to push against the limits of present technical knowledge or well beyond normal operating speed ranges. Nevertheless, there are ways of reducing expenditure on tests. It can be kept to a minimum by carefully



considering, prior to the tests, what must be investigated and how the measurements must be taken so that every test provides information about as many targets of investigation as possible and for the maximum number of research partners. Outlay can be kept down on test tracks or experimental sections of line by: the use of an appropriate wheel measuring technique; a purposeful evaluation procedure which draws on the opportunities offered by electronic data processing; and the use of electronic storage systems, to store all the information needed to plan, coordinate and hold the tests as efficiently as possible, together with the relevant measurement data and results. It is important for all data to be readily accessible at all times to all the research partners. One of the reasons for this is to enable each research partner to be fully up to date with the state of technical knowledge when carrying out improvements to some part of the rail system. Only when all these requirements have been met will it be possible, in the limited time available in the face of competition from other rapid, efficient and developing transport systems, to carry out thorough modifications and improvements to the "railway of today" so that it can withstand every aspect of that competition and thereby be of economic benefit to Europe.

Herbst, W *Rail International* Vol. 11 No. 6, June 1980, pp 356-368

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

## 24 322647 CONRAIL'S REDUCED CAPITAL PROGRAM COULD JEOPARDIZE THE NORTHEAST RAIL FREIGHT SYSTEM

Because of limited funds, Conrail is planning to reduce its spending on track rehabilitation, additions and improvements to the physical plant, and equipment. GAO believes such cutbacks, which are similar to the strategy which contributed to the collapse of the Northeast rail system, would pose an unacceptable risk to the Federal investment in Conrail.

General Accounting Office CED-80-56, Mar. 1980, 32p, 1 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548

DOTL RP

## 24 322786 RAIL-BASED HOLDING COMPANIES: A VIEW OF SOME INDICATORS OF STRATEGY, MANAGEMENT CHANGE, AND FINANCIAL PERFORMANCE

Rail-based holding companies developed in the 1960s and by 1972 there were 16 which represented a significant portion of the nation's Class I rail mileage. This study is directed at ten such firms, identifying the relation between rate of return on railroad assets and the decision to diversify; examining the degree to which holding companies headed by rail-oriented presidents have engaged in non-rail diversification; and analyzing rail-based holding company performance after their diversification into non-rail activities.

Graham, KR (Pennsylvania State University, University Park) *Transportation Journal* Vol. 19 No. 4, 1980, pp 73-77, 5 Tab.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

DOTL JC

24 322907  
**CONRAIL'S ED JORDAN: THE MEANING OF DEREGULATION**  
An interview with Conrail's chairman and chief executive officer explores the potential for this railroad of deregulation, seen as essentially a long-term proposition although immediate steps would be taken. Deregulation is not Conrail's sole problem; a major one is the steady decline of rail-hauled traffic in the Northeast. Countermeasures will have to include shrinkage of both plant and work force. Although progress has been made through marketing and by cutting labor costs, traffic levels, capital requirements and regional mergers all cloud Conrail's outlook.

*Railway Age* Vol. 181 No. 20, Oct. 1980, p 33

ORDER FROM: ESL

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## 24 322923 TRANSPORT INFRASTRUCTURE INVESTMENT: THE KEY TO A BETTER FUTURE

The author, chairman of British Railways Board, argues that the railways are well equipped to withstand the energy crisis. He reviews the advances made by BR, in passenger transport with the development of the new APT (advanced passenger train), and the reorganization of freight transport to meet the needs of British industry more effectively. He also discusses the Channel Tunnel project and underlines the value of investing in the railways.

*Rail International* Vol. 11 No. 7-8, July 1980, pp 411-414, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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## 24 322935 RAILWAY COOPERATION AS PART OF EUROPEAN INTEGRATION [Die Zusammenarbeit der Eisenbahnen im Rahmen der europaischen Integration]

Because of the particular structure of the railway mode of transport, close international cooperation has existed between the European railways for a long time. Since energy and environmental problems have come to the fore, the importance of the railway for the economic and social development of Europe is being generally recognized. The Railways will however only be able to play their full part if the groundwork is provided by a transport policy on a European scale. [German]

Haefner, P *Die Bundesbahn* Vol. 56 No. 6, June 1980, pp 395-398

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

## 24 322959 REPORT ON JOINT CONFERENCE, ENO FOUNDATION BOARD OF DIRECTORS AND BOARD OF CONSULTANTS, OCTOBER 25 AND 26, 1979: PART II: MODAL PRODUCTION IMPROVEMENT AND RELATED ENERGY PROBLEMS

The different transportation modes emerged independently and must now cooperate to determine the role each should play in order to maximize productivity and stem inefficiencies, particularly that of automobile usage. If the transportation industry takes the initiative to increase and coordinate modal efficiency, there will be less need for regulation and government policies. A comparison of airline, motor, rail, and water productivities with that of the general economy is made by analyzing the factor components of each. The separate goals and problems of individual modes are indicated to underscore the need for better cooperation.

*Traffic Quarterly* Vol. 34 No. 2, Apr. 1980, pp 196-232, 5 Ref.

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: ESL

DOTL JC

## 24 323237 TRADE UNION MERGERS AND LABOR CONGLOMERATES

From the time of consolidation of the AFL and CIO in 1956 until 1979 there were 57 other mergers involving 117 national unions and employee associations. This research examined five cases of union mergers to draw some generalized conclusions. While the merger that produced the United Transportation Union is discussed in the light of technological innovation in the railroad industry and competition from other modes, it is not one of the major studies. Although there are certain economies of scale and enhanced bargaining power in larger unions produced by mergers, the importance of such organizations may be determined primarily by the structure of the industries with which they are involved.

Chitayat, G  
Praeger Special Studies 1979, 225p, Tabs., 5 App.

ORDER FROM: Praeger Special Studies, 383 Madison Avenue, New York, New York, 10017

## 24 323367 THE COMPLEMENTARY ASPECT, COMPETITION AND SPECIALIZATION OF TRANSPORT MODES [Complementarite, concurrence et specialisation des transports]

The road and railway networks in Africa are highly inadequate: they are not sufficiently dense, are ill-matched and sometimes non-existent in certain

countries. An effort is being made to develop air transport but the equipment is insufficient, and freight/mile and passenger/mile costs slow its expansion. Water transport carries 90% of the freight. 97.5% of companies are not African. Another problem is the congestion of harbours. A better utilization of each transport mode must be sought. [French]

Traore, A. *Courrier Afrique-Caraibes-Pac-Comm Europeenne* No. 54, 1979, pp 77-78, 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 109803), Central Laboratory of Bridges & Highways, France, Road Research Centre, Belgium

ORDER FROM: Commission des Communautés Européennes, Rue de la Loi 200, Bruxelles, Brabant, Belgium

24 324426

#### ROLE AND MANAGEMENT OF RAILWAYS IN JAPAN

The role played by the Japanese railroads and their current and future operations in railroad transportation are discussed.

Nisugi, I. *Civil Engineering in Japan* Vol. 18 1979, pp 1-9

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

24 324943

#### HEAVIER TRACKS--AND MORE OF THEM

Major gaps in NdeM's network on the Guadalajara-Monterrey axis and between Mexico City and Tampico will have to be bridged.

*Railway Gazette International* Vol. 136 No. 8, Aug. 1980, pp 676-678, 1 Fig., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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24 325463

#### THEORY FOR ESTIMATING TRAFFIC DIVERSIONS ON A RESTRUCTURED U.S. RAILROAD SYSTEM

Each proposal to restructure the U.S. railroad system involves an analysis of the extent to which traffic will shift from existing routes to new routes offered by the restructured network. Classically, this exercise was conducted manually by traffic clerks and marketing personnel; however, the recent availability of machine-readable nationwide railroad traffic data enables these analyses to be done efficiently by a computer. An elementary model of traffic diversions suitable for estimating traffic diversions that result from a limited restructuring of the U.S. railroad system (i.e., individual mergers such as the Burlington Northern and the St. Louis-San Francisco Railway Company) is based on the redistribution of traffic among existing routes and new routes on the merged railroads. However, if all or most of the railroads are merging or changing configuration, all or most of the existing routes will be modified and therefore all new routes must be generated; this is termed the advanced model. This paper develops in detail the underlying theory for estimating traffic diversions on a vastly restructured railroad system. Historical shipper behavior data are presented to justify route selection and traffic assignment procedures. A stepwise application of the method is described and results are presented.

This paper appeared in Transportation Research Record No. 758, Surface Freight: Rail, Truck, and Intermodal.

Kornhauser, AL, Hornung, M, Caudill, RJ. *Transportation Research Record* No. 758, 1980, pp 34-41, 4 Fig., 1 Tab., 15 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

24 329938

#### A REVIEW OF THE STATE OF THE ART--AND SOME SPECULATIONS

Having previously explored the potential of various technological advances in motive power, freight cars, computer, yards, maintenance-of-way, and intermodal systems, this concluding installment considers the effects on the railroad industry of such hardware when combined with deregulation, mergers, new management practices, altered labor relations and increased competitiveness.

Welty, G. *Railway Age* Vol. 181 No. 23, Dec. 1980, pp 22-25, 9 Phot.

ORDER FROM: ESL

DOTL JC

24 329973

#### THE TRANSPORT FIELD: REPORT OF THE PRESENT SITUATION AND PROGNOSIS FOR THE PERIOD UP TO 1990

[Transportsektorn: redovisning av aktuell situation och prognos foer tiden fram till aar 1990]

This report gives a description of the Swedish development in the transport field in the seventies and also some estimates regarding the situation up to 1990. Passenger and freight transport, within the country and abroad, are dealt with. The total vehicle kilometers are calculated and divided into various means of transport. The vehicle kilometers for passenger transport increased sharply in the beginning of the seventies. In particular, the number of journeys to and from work increased as did public transport. The increases are expected to continue but at a somewhat slower rate. Even freight transport increased sharply in the beginning of the seventies. Then it decreased after 1974, before a new increase in 1979. The railroad and road transport handle about equal parts of the long-distance transport. The railbound transport, however, is expected to increase. The entire freight transport is expected to increase somewhat more than in the seventies. This is, however, dependent on the future industrial growth and supply of energy. [Swedish]

TRANSPORTRAADET Monograph TRP 1980:3, 1980, 52p, 8 Fig., 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 251159), National Swedish Road & Traffic Research Institute

ORDER FROM: TRANSPORTRAADET, Box 1339, Solna, Sweden

25 301262

**CURRENT ISSUES IN TRANSPORTATION POLICY**

Dealing with the most important issues in transportation policy on urban, regional, national, and international bases, this book cuts across all major forms of transportation to look at the problems from an interdisciplinary perspective. The contributors are drawn from industry, academia, government, and consumer organizations. /Lexington Books/

Altshuler, A (Massachusetts Institute of Technology)

Heath Lexington Books, (0-669-02623-9) 1979, n.p., Figs., Tabs., Refs.

ORDER FROM: Heath (DC) and Company, Department RS, 125 Spring Street, Lexington, Massachusetts, 02173

25 312260

**EFFECTS OF FEDERAL TRANSPORTATION FUNDING POLICIES AND STRUCTURES: OVERVIEW**

Several recent policy developments in highways, airports and transit were analyzed in this study of the effects of federal funding policies and structures on transportation investment. Six discrete transportation analyses (Mass transit; highway matching requirement and funding levels, preliminary model; statistical analysis of the impact of federal highway and on state allocation decisions; Appalachian Development Highway System; Analysis of State highway projects by federal aid system and type of work; airport development aid program) were performed and the resulting conclusions were used to suggest basic principles which were investigated through interviews. This overview report sets forth the implications of manipulations of matching ratios, allocation mechanisms, and categorical restrictions in federal aid programs. Recommendations regarding the specification of these funding structures are cast as a function of funding intent. The four intent categories used are: compelling national interest; regional development; aim of motivating the recipient to expand more of his own funds on the program; and provision of financial relief on this program to the recipient. This overview paper also reports on interviews with transportation professionals. The perceived effects of the 1978 Surface Transportation Act as regards funding parameters are noted and recommendations are made.

Porter, AL Park, CY Rees, LP Connolly, T Rao, S Larson, TD Georgia Institute of Technology, Pennsylvania State University, University Park, Department of Transportation Final Rpt. DOT-P-10-80-10, Dec. 1979, 86p, 8 Fig., 8 Tab., Apps.

Contract DOT-OS-70036

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25 314438

**EVALUATION OF THE STATE RAIL ASSISTANCE PROGRAM: FINDINGS AND GUIDELINES FOR PROGRAM EVALUATION AND FINANCIAL MANAGEMENT**

In October 1978, the Office of State Assistance Programs contracted for an evaluation of the State Rail Assistance Programs. The objectives of the evaluation were to: evaluate the effectiveness of the program in meeting its objectives as established by the congress and as perceived by the states and other program participants; and provide a sound framework for continued evaluation of the program by Federal Railroad Administration and state officials. This document contains the results of the evaluation.

Ernst and Whinney, Federal Railroad Administration Jan. 1980, 259p

Contract DOT-FR-8211

ACKNOWLEDGMENT: NTIS

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PB80-190069

25 315328

**REGULATION AND DEREGULATION**

Transportation in the United States is subject to economic and social regulation of bewildering complexity and is administered by a variety of institutions in pursuit of numerous desired ends. This paper describes the nature of current state-and federal-level transportation regulation, especially economic regulation. Because the future of transport regulation has been called into question, the paper also discusses proposals for deregulation and investigates their potential impacts. Finally, issues are raised about the relation of regulatory change to state transportation planning and program administration and to state agencies charged with these duties. It is reasonable to believe that transport regulation will gradually become less at

the national level and that state regulation will be subject to similar pressures and relax rather than increase. The outlook for energy regulation and for social regulation is less certain, but relaxation of federal controls in those fields appears more likely than is the maintenance of the status quo. The general atmosphere in transport markets will thus become more competitive. Special state issues will likely include the following: 1. How to ensure transport safety with new, perhaps less profitable, perhaps smaller, and possibly more, innovative firms; 2. How to analyze and supply subsidies for desired public purposes in the absence of internal cross subsidy by transportation firms; 3. How to produce neutral public policy toward transport rights-of-way and infrastructure; 4. How to plan and allocate public facilities needed by transport firms in the changed markets resulting from deregulation; and 5. How to obtain and distribute information of interest to consumers plus information needed for planning in a fast-moving deregulated atmosphere. (Author)

This paper appeared in Transportation Research Board Special Report No. 189: State Transportation Issues and Actions.

Fuller, JW (National Transportation Policy Study Commission) *Transportation Research Board Special Report* No. 189, 1980, pp 37-58, 2 Tab., 83 Ref.

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25 316369

**NATIONAL TRANSPORT PLAN. METHODOLOGY [Plan nacional de transporte. Metodologia]**

This paper outlines the methodology used by the planning section of the Colombian Ministry for Public Works to develop a national transport plan defining necessary highway, railway and river projects. This methodology is applicable mainly to medium-and long-distance, inter-regional and national transport. For the covering abstract see IRRD abstract no 108676. [Spanish]

16th National Congress of Civil Engineering, October 4-8, 1978, Cali, Colombia.

Jaramillo, H

Ministerio de Obras Publicas y Transporte Oct. 1978, 32p, 47 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 108677), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain

ORDER FROM: Ministerio de Obras Publicas y Transporte, Oficina de Planeamiento, Cali, Colombia

25 318428

**EFFECTS OF FEDERAL TRANSPORTATION FUNDING POLICIES AND STRUCTURES. FINAL REPORT (APPENDIX A THROUGH F)**

The study focuses on the effects of Federal funding policies and structures of transportation investment. Several recent policy developments in highways, airports, and transit were analyzed toward this end. Procedurally, the work progressed by performing six discrete transportation analyses and then drawing together insights gained from these to suggest basic funding principles. These principles are then investigated through interviews on the 1978 Surface Transportation Act with 21 transportation professionals.

See also report dated Dec 79, PB80-197536. Prepared in cooperation with Pennsylvania State Univ., University Park.

Porter, AL Park, CY Rees, LP Connolly, T Rao, S

Georgia Institute of Technology, Asst Secretary for Policy & International Affairs Final Rpt. DOT-P-10-80-09, Dec. 1979, 329p

Contract DOT-OS-70036

ACKNOWLEDGMENT: NTIS

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PB80-197528

25 318429

**EFFECTS OF FEDERAL TRANSPORTATION FUNDING POLICIES AND STRUCTURES. OVERVIEW**

The study focused on the effects of Federal funding policies and structures of transportation investment. Several recent policy developments in highways, airports, and transit were analyzed toward this end. The underlying philosophy is presented in the Overview Report.

See also report dated Dec 79, PB80-197528. Prepared in cooperation with Pennsylvania State Univ., University Park.

Porter, AL Park, CY Rees, LP Connolly, T Rao, S

Georgia Institute of Technology, Asst Secretary for Policy &  
International Affairs Final Rpt. DOT-P-10-80-10, Dec. 1979, 90p

Contract DOT-OS-70036

ACKNOWLEDGMENT: NTIS

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25 319922

**THE ECONOMIC REGULATION OF WESTERN COAL  
TRANSPORTATION: AN UNNECESSARY CONFLICT BETWEEN  
NATIONAL ENERGY AND TRANSPORTATION POLICIES**

This report evaluates Interstate Commerce Commission regulation of railroad transportation of western coal, also addressing the National Energy Plan's goal of encouraging major users of fuel oil and natural gas to embark upon coal conversion programs. Special emphasis is given to implications for the State of Texas. It is concluded that ICC Rail Form A costing is not applicable to coal movements, that Section 205 of the 4R Act should not be used to permit an entire railroad's net investment to be used for establishing a reasonable return on a specific movement and for using differential pricing, that Section 202 of the 4R Act covering market dominance and maximum rate regulation may be interpreted to permit monopolistic pricing, and that factors other than rail freight tariffs may also discourage the increase in domestic coal production and consumption.

Texas University, Austin Policy Res Proj 38, 1980, 405p, 23 Fig., 39 Tab., 4 App.

ORDER FROM: Texas University, Austin, Lyndon B Johnson School of Public Affairs, Austin, Texas, 78712

25 319955

**FRANCE: OPTIMISM REFLECTS NEW POPULARITY**

Last year the SNCF signed a new contract with the State, designed to stabilize relations between the two parties by ensuring an adequate level of investment to guarantee future development and determining the amounts to be paid by the State to cover infrastructure and social costs, while at the same time giving the SNCF greater social autonomy.

*International Railway Journal* Vol. 20 No. 4, Apr. 1980, p 21, 4 Fig., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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25 322176

**EXAMINATION OF UNITED STATES RAILWAY  
ASSOCIATION'S FINANCIAL STATEMENTS, FISCAL YEAR 1979**

The United States Railway Association monitors and provides financing for Conrail, which operates railroads in the Midwest and Northeast. Because Conrail's future is uncertain, GAO questions whether the Government's investment will be repaid. This circumstance, and the material effect that Conrail securities have on USRA's assets and income, make it impossible for GAO to render an opinion on USRA's fiscal year 1979 financial statements.

General Accounting Office CED-80-107, July 1980, 17p, 1 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548

25 322535

**PROPOSALS FOR RAILROAD REGULATORY REFORM**

In the face of declining market share and worsening financial conditions in the railroad industry, the Federal government has moved to loosen regulatory constraints and encourage railroads to earn their way in a competitive, free enterprise system. This analysis examines the legislative proposals that sought to achieve ends which, despite early promise, had not been obtained under the 4R Act of 1976. Three bills were submitted in 1980. Their potential effects were examined in the following areas: Rate levels and regulation; contract carriage; division of revenues from joint rates; curtailment of antitrust immunity for rate bureau activities; abandonments; entry into rail transport; rationalization of industry structure; and freight car utilization.

American Enterprise Institute May 1980, 52p

ORDER FROM: American Enterprise Institute, 1150 17th Street, NW, Washington, D.C., 20036

DOTL LAW KF 2289.A73

25 322648

**HOW THE LAW TO PREVENT DISCRIMINATION AND  
ENCOURAGE MINORITY PARTICIPATION IN RAILROAD  
ACTIVITIES IS BEING IMPLEMENTED**

The Railroad Revitalization and Regulatory Reform Act of 1976 provides that no person shall be discriminated against in any program or activity funded through financial assistance under the act. The Federal Railroad Administration is responsible for carrying out these provisions. The act also directed the establishment of a minority resource center to help minority-owned businesses participate in the business generated from maintaining, rehabilitating, restructuring, improving, and revitalizing the Nation's railroads. This report to the Chairman, Subcommittee on Transportation, House Committee on Appropriations, and Congressman Bennett M. Stewart concludes that the Federal Railroad Administration has not adequately implemented the nondiscrimination provisions of the act. For example, financial assistance was granted to a number of recipients before the required affirmative action plans were approved, and some plans still have not been approved. The Administration also has not systematically monitored recipients' program toward established goals. The Administration has initiated actions which can improve its effectiveness.

General Accounting Office CED-80-55, Feb. 1980, 69p, 3 App.

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25 322649

**INFORMATION ON U.S. RAILWAY ASSOCIATION CONTRACTS  
WITH LAW FIRMS**

GAO evaluated the U.S. Railway Association's procedures for contracting with law firms and assuring that charges made are accurate. This report provides the requested information and also shows that the Association is not requiring all law firms to follow its procedures for monitoring contractor expenditures and performance. GAO is making a recommendation to correct the weaknesses noted. This report was requested by the Chairman, Subcommittee on Transportation and Commerce, House Committee on Interstate and Foreign Commerce.

General Accounting Office CED-79-78, Apr. 1979, 11p, 1 App.

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DOTL RP

25 322803

**CONTRACT RATES ARE CATCHING ON**

Contract rates were allowed by ICC in advance of more complete deregulation finally enacted by Congress in 1980. ICC already listed more than 60 contracts between railroads and their shippers involving specific annual volumes, quality of service, guarantees of car or trailer supply and other factors. Commodities involved in early contracts included grocery and food products, chemicals, automobile parts, building materials, and other freight.

Malone, F *Railway Age* Vol. 181 No. 18, Sept. 1980, p 32

ORDER FROM: ESL

DOTL JC

25 322908

**MOTOR CARRIER ENTRY CONTROL MODIFICATION:  
RAILROAD TRUCKING RESTRICTIONS AND COMMON  
OWNERSHIP. WORKING PAPER NO.12**

This paper focuses on legal restrictions imposed on railroad trucking operations and particularly those affecting piggyback services. It is suggested that either railroads were not interested in eliminating restrictions so they could receive new operating authority for TOFC service, or that ICC policies have been so restrictive that any such action had been foreclosed. Because ICC regulation prevented railroad-owned trucking from developing any "hinterland" beyond TOFC ramps, the potential has been limited. While relaxing restrictions so railroads would have greater competitive freedom would require some corollary modifications, a proposed end of regulation of TOFC service is seen as proving its real economic worth and giving preliminary indication of possible market effects of common ownership for all freight transport modes.

National Transportation Policy Study Commission, Iowa University Sept. 1979, 30p, 2 Tab., Refs.



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PB80-138225

25 322909

## INTERSTATE COMMERCE COMMISSION STAFF RESEARCH REVIEW; THE RAIL SERVICES PLANNING OFFICE MERGER PROJECT. WORKING PAPER NO. 1

This paper reviews and evaluates the Rail Merger Study of the ICC's Rail Services Planning Office. The review was intended to develop improved policies for economic regulation of transportation and for fostering an efficient, effective rail system. RSPO itself had been charged with reviewing advantages and disadvantages of mergers, identifying the principal problems involved and proposing solutions so ICC could ascertain if any specific merger were in the public interest. Seven issue papers covered various facets of the merger question and were summarized in an executive summary. NTPSC found that RSPO recommendations come from public meetings where groups most touched by mergers--railroads, shippers and labor--offered opinions. Most were broad principles or narrow procedural matters rather than "policy criteria" for judging mergers in a broad context. Dealing with fundamental issues and developing associated policy criteria would require a stronger research base than RSPO had applied.

National Transportation Policy Study Commission, Iowa University Jan. 1978, 15p

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PB-298344/3SL

25 322974

## RECENT TRANSPORT POLICY INITIATIVES IN CANADA: A NEW ROLE FOR THE GOVERNMENT

This paper examines critical issues surrounding the modified role of the government in transportation developments in Canada.

Khan, AM (Carleton University, Canada) *Journal of Advanced Transportation* Vol. 13 No. 1, 1979, pp 19-37, 19 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institute for Transportation, Incorporated, 1410 Duke University Road, Durham, North Carolina, 27705

25 324915

## ECMT. ROUND TABLE 48 (PARIS, 29 AND 30 NOVEMBER 1979). TRANSFER OF TRAFFIC ACROSS THE TRANSPORT SECTOR: EVALUATION OF EFFECTS OF REDISTRIBUTION [CEMT. Table ronde 48 (Paris, 29 et 30 novembre 1979). Les transferts a travers le secteur des transports: evaluation des effets redistributifs]

Report on the 48th Round Table on Transport Economics, held in Paris on 29 and 30 November 1979, including a study by Professor J.G. Lambooy on the problems of redistribution of investments in the transport sector, followed by a summary of the Round Table discussion which took place afterwards. [French]

European Conference of Ministers of Transport UIC Cat. 01 0 7, 1980, 102p, 7 Tab., 9 Phot., 184 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006

25 325705

## THE ICC AND COAL UNIT TRAIN RATES

In regulation of unit-train rates two decades ago, ICC sought to assure that the tariffs were not predatory (against competing carriers) or discriminatory (against non-qualifying shippers) but would allow Eastern railroads to retain some of their declining coal traffic. Inflation, the energy crisis that has increased coal's value as a utility fuel, the rise in Western coal production, and the 4R Act with its mandate for ICC to allow railroads to attain revenue levels that would be sufficient to attract equity capital have all combined to change the ratemaking philosophy of railroads and the ICC's regulatory procedures. ICC has been developing an improved method for costing railroad service and in reexamining its regulatory procedures to comply with 4R Act provisions.

Coal Production & Transportation: Sixth Annual Conference-- 1980, April 2-3, 1980, Fairmont Hotel, San Francisco, California.

Alexis, M (Interstate Commerce Commission)

PLM, Incorporated Conf Paper 1980, pp 41-57, 33 Ref.

ORDER FROM: PLM, Incorporated, 50 California Street, San Francisco, California, 94111

25 325925

## LIVING WITH CHANGE

The author, President of Netherlands Railways, speculates on the future of rail transport faced with the speed at which the components of the social system change. In the Netherlands the high cost of energy is bringing about a switch from private transport to public transport tailored to real needs. This growth will involve reviewing the whole transport system and its operation, and the Government will therefore have to choose priorities involving sometimes difficult options. In conclusion, the author hopes for the improvement of the railway infrastructure, both through new construction and also through enhancement of the capacity of the existing system.

Ploeger, LF *Rail International* Vol. 11 No. 9, Sept. 1980, pp 485-488, 1 Phot

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

25 326185

## INTERIM REPORT ON POTENTIAL ICC/ETIP (INTERSTATE COMMERCE COMMISSION/EXPERIMENTAL TECHNOLOGY INCENTIVES PROGRAM) ADMINISTRATIVE EXPERIMENTS

The document describes work performed toward evaluating the commercial effects and implications for innovation of the recent decision of the Interstate Commerce Commission (ICC) to exempt railroad transportation of fresh fruits and vegetables from regulation. The first chapter provides an introduction and summary. Chapter II describes the historical background of ETIP's work in the area of regulation and freight transportation innovation, and the genesis of ICC's regulatory exemption for rail transportation of fresh produce. Chapter III discusses expectations, concerns and issues related to this exemption, and the environment for change in fresh produce rail transportation operations. Chapter IV addresses possible effects of the exemption on the ICC and in the commercial sector. Chapter V discusses other areas of transportation regulatory change which may be appropriate for study by ETIP.

Mulkey, M Frederick, W Fulmer, D

Performance Development Institute, National Bureau of Standards NBS-GCR-ETIP-80-85, Mar. 1980, 170p

Contract NBS-7-35822

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-202575

25 326186

## MECHANISMS FOR POLICY DEVELOPMENT AND ACCEPTANCE

The paper describes the approach used by NTPSC staff to formulate policy recommendations. This approach is compared with methods used in previous transportation policy studies and other approaches suggested by NTPSC staff. The selective and sometimes biased modal orientation of preceding studies is set in contrast with the NTPSC's approach based on the urban, rural, intercity, and international markets for passenger and freight. Further, the contrast between the frequently historical orientation of other studies and the emphasis on the future by NTPSC is noted. Additional concerns other than strict economic efficiency--concerns such as energy, safety, and the environment--are formulated in a values package that is new to the discussion of transportation. The role of the three basic policy categories applied by the staff--Status Quo, Net Benefits, and Values--is presented, and the NTPSC's process of impact analysis is also described.

National Transportation Policy Study Commission NTPSC/WP-79-25, Jan. 1979, 61p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-202682

25 329964

## VICTORIAN TRANSPORT STUDY : LAND TRANSPORT IN VICTORIA- HISTORICAL BACKGROUND

Throughout the history of Victoria there has been a direct interdependence between transport and the social and economic development of the state.

The railways played a very significant role in the development of the state for close on its first hundred years (and in the metropolitan area this role was reinforced by the tramways during the city's second 50 years or so). By the 1930s, the motor vehicle was growing in numbers and was beginning to effectively compete with the railways for people and goods movement. Regulation of transport was introduced to protect the railways. This regulation, and the Second World War and petrol rationing, safeguarded the railways during the 1930s and 1940s. However, since the early 1950s, the position of the railways (and other public transport) has steadily declined to the stage where many parts of the transport task can now be much more effectively and economically performed by the motor vehicle. This dominance of the motor vehicle has had, and will continue to have, a marked effect on the development of the state. This background paper briefly reviews the history of land transportation in Victoria, in order to give some insight into the relationship between each of the transport modes, and between transport and state development (A). TRRL

Ministry of Transport, Victoria Monograph 1980, 32p, 14 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 239926), Australian Road Research Board

ORDER FROM: Ministry of Transport, Victoria, 570 Bourke Street, Melbourne, Victoria, Australia

26 313931

**COAL TRANSPORTATION (CITATIONS FROM THE NTIS DATA BASE)**

Economic and engineering aspects of coal transportation by truck, rail, water, and pipeline are discussed. Abstracts cover cost comparisons of the various transportation modes and factors affecting future expansion of the transportation systems. A few abstracts deal with environmental effects and pretreatment of coal for transportation. (Contains 66 abstracts)

Hundemann, AS

National Technical Information Service Mar. 1980, 73p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-806292

26 318779

**RAILROAD MANAGEMENT PLANNING, 1974-JUNE, 1980 (A BIBLIOGRAPHY WITH ABSTRACTS)**

Studies are presented of railroad planning concerning operating costs, yard operations, intermodal systems, railway abandonment and consolidation, efficiency in operations and services, freight car utilization systems, forecasting future railroad freight and passenger market and the potential of energy conservation in railroad transportation. (This updated bibliography contains 202 abstracts, 46 of which are new entries to the previous edition.)

Kenton, E

National Technical Information Service July 1980, 209p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB80-812753

26 319690

**FREIGHT TRANSPORT. A SELECT LIST OF MATERIAL BASED ON THE DOE/DTP LIBRARY**

This general introductory bibliography on freight transport has been compiled as a contribution to the Aslib Transport and Planning Group Seminar on "Freight Movement: Solving the Information Problems", held at Oxford Polytechnic, 3rd-4th April 1979. Although some earlier works are included the main focus is on developments since the transport policy consultation document was published in 1976 preceding the publication in 1977 of the white paper on transport policy. Reactions to the consultation document from several of the freight organisations are included in this bibliography. Section A, highlights DTP publications and includes a selection of TRRL reports relating to freight; section B brings together references to freight transport in general, prior to a consideration in section C of the different modes of freight transport (road; rail; ports and shipping; inland waterways; air freight; pipelines); some key policy considerations are considered in section D (safety, energy and environmental aspects) and a selection of material relating to freight transport in other countries is included in section E; section F lists some of the main statistical series relating to freight and in section G, some bibliographies, research lists and abstracting journals are included. (TRRL)

Rattue, J Lambert, CM

Department of the Environment, England, (0 7184 0167 0) Bibliography 17F, Apr. 1979, 58p, Refs.

ACKNOWLEDGMENT: TRRL (IRRD 248119)

ORDER FROM: Department of the Environment, England, 2 Marsham Street, London SW1P 3EB, England

26 322972

**TRANSGUIDE: A GUIDE TO SOURCES OF FREIGHT TRANSPORTATION INFORMATION**

This publication includes a description of currently available information sources for all modes of freight transportation. Included are publications, bibliographies, guides and directories, maps, statistical presentations, and special studies/services. Areas covered: Air transportation, commodity classifications, general (all modes), highways and truck transportation, pipelines, railroads and rail transportation, freight traffic flows, and waterways and marine transportation. Entries include ordering information and are fully indexed.

Reebie (Robert) and Associates, Incorporated 1980, 400p

ORDER FROM: TRANSGUIDE, P.O.Box 1278, Greenwich, Connecticut, 06830

# Ongoing Research Summaries

00 102894

## STRUCTURAL BEHAVIOR OF A SKEWED, PRESTRESSED CONCRETE, RAILROAD TROUGH STRUCTURE

A heavily skewed, prestressed concrete railroad bridge with a trough-shaped cross-section was heavily instrumented with SR-4 gauges, Carlson stressmeters and strainmeters, vibrating wire gauges, thermocouples. Gauges were scanned on a round-the-clock basis for an extended period following concrete pouring to determine stresses due to temperature differentials, prestressing, creep and dead load. Some live load tests were made with moving trains. Results of finite element analyses will be compared with experimental ones.

PERFORMING AGENCY: California Department of Transportation, Office of Structures Design, Study No. 14-624161

INVESTIGATOR: Davis, RE

SPONSORING AGENCY: California Department of Transportation; Federal Highway Administration, Structures and Applied Mechanics Division

RESPONSIBLE INDIVIDUAL: Ballinger, CA Hare

HP&R D-4-115

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1972 COMPLETION DATE: June 1982 TOTAL FUNDS: \$530,000

ACKNOWLEDGMENT: California Department of Transportation, Federal Highway Administration (111102353)

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 Tunnelling Association (ITA) environmental impact. The committee's work 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. The Committee also participates in the activities of the International Tunnelling Association (ITA) on behalf of the scientists, engineers, and technologists of the United States. The ITA was formed in 1974, and several cooperative projects are underway on such subjects as planning use of the subsurface, research needs, standardization, safety, contractual sharing of risk, and seismic effects.

PERFORMING AGENCY: National Academy of Sciences; National Academy of Engineering

INVESTIGATOR: Bangert, RL Tel (202) 389-6831

SPONSORING AGENCY: Bureau of Mines

RESPONSIBLE INDIVIDUAL: Marchant, W Tel (202) 634-1140

Contract JO199025

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1972 COMPLETION DATE: Dec. 1981

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: Bureau of Mines

RESPONSIBLE INDIVIDUAL: Marchant, W Tel (202) 634-1140

Contract JO199030

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Dec. 1967 COMPLETION DATE: Sept. 1981

00 138532

## CONSTRUCTION TECHNOLOGY

The results of the Urban Rail Construction Technology program will assist policy makers and the transit industry in evaluating construction alternatives which show areas of cost savings, safety enhancement and increased performance and reliability. The primary goal of the program is to bring about significant reduction in construction cost of urban rail transit system facilities by implementing new technologies and by improving design, construction and contracting practices in the urban rail transit construction industry. The four major thrusts of the program are underground, at-grade track and wayside, elevated structures and contracting and management.

PERFORMING AGENCY: Urban Mass Transportation Administration; Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, GL

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: 1973 COMPLETION DATE: 1985 TOTAL FUNDS: \$30,000,000

ACKNOWLEDGMENT: UMTA



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, SL

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1504

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$349,000

ACKNOWLEDGMENT: TSC

00 179327

**RAILROAD BALLAST AND SUBGRADE REQUIREMENTS STUDY**

The object of this program is to investigate the current railroad substructure practices and technology, related engineering practices, and ongoing research in geotechnology, highway and airfield design and evaluation, and railroad structures. From this investigation criteria and guidelines will be developed for track substructure design and a technology assessment of the current practices will be evaluated. If any inadequacies are discovered from the technology assessment a research program will be implemented to investigate them.

PERFORMING AGENCY: Goldberg, Zoino, Dunncliff and Associates, DOT-TSC-1527

INVESTIGATOR: Simon, R Tel (617) 244-4100

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lamond, J Tel (617) 494-2544

Contract DOT-TSC-1527

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1978 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$326,400

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 line a tunnel section and eliminate the need for primary support. The three phases of the 44 month program are: I. Laboratory Research and Development; II. System Engineering Design; III. System Development and Demonstration.

PERFORMING AGENCY: Foster-Miller Associates, Incorporated

INVESTIGATOR: Maser, KR 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. 1980 START DATE: Dec. 1977 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$2,287,101

ACKNOWLEDGMENT: TSC

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: Agbabian Associates

INVESTIGATOR: Balachandra, MB

SPONSORING AGENCY: National Science Foundation, Division of Applied Research, DAR 76-80044

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$498,600

ACKNOWLEDGMENT: Agbabian Associates

00 185230

**SUBSURFACE EXPLORATION FOR TRANSIT TUNNELING**

Employ selected innovative geotechnical and geophysical exploration and instrumentation techniques on an ongoing transit tunnel project: Evaluate the feasibility, applicability, reliability and cost effectiveness of the selected techniques; use the selected techniques to define the real and relevant geotechnical unknowns in test sections; evaluate the accuracy of the geotechnical predictions with appropriate field instrumentations, monitoring and mapping during construction; to demonstrate the effectiveness of instrumentation and monitoring during construction in documenting the effects of tunneling on adjacent structures; to provide data during construction for use by designers and contractors which can be employed to evaluate tunneling procedures and their effects on ground deformations so that modifications might be employed in critical areas and to evaluate need for protecting structures.

**REFERENCES:**

Field Evaluation of Advanced Methods of Subsurface Exploration for Transit Tunneling, Thompson, D; Humphrey, J; Young, L; Wall, C, June 1980

PERFORMING AGENCY: Bechtel Corporation

INVESTIGATOR: Sutcliffe, H Tel (617) 628-9600

SPONSORING AGENCY: Transportation Systems Center; Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Mattson, P Tel (617) 494-2431

Contract DOT-TSC-1570

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1978 COMPLETION DATE: July 1981 TOTAL FUNDS: \$411,000

ACKNOWLEDGMENT: Bechtel Corporation

00 185235

**RAIL PHOTOLOG**

The study is designed to develop, build, and test a hi-rail vehicle equipped with a photolog and track-measurement capability and to provide the ConnDOT with a film library of all trackage within the physical boundaries of the State of Connecticut. All rail lines in the state have been contacted and have, or will be, participating in the filming operations. The resulting film will be useful to engineers, planners, designers, and personnel concerned with the maintenance and inventory of railroads.

PERFORMING AGENCY: Connecticut Department of Transportation, Bureau of Planning and Research, 850-50

INVESTIGATOR: Bowers, DG Tel (203) 529-7741 X49 Hudson, JJ

SPONSORING AGENCY: Connecticut Department of Transportation

RESPONSIBLE INDIVIDUAL: Dougan, CE Tel (203) 529-7741 X76

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: June 1981 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: Connecticut Department of Transportation

00 196736

**BRIDGE EVALUATION**

To determine the stress levels in various bridges on the CN system and to determine the useful life of such bridges, appropriate electronic instrumentation is being developed to measure stress levels in various bridges and to analyze data on such bridges under dynamic loadings. This will optimize capital and maintenance expenditures in the maintenance or renewal of bridges on the CN system.

PERFORMING AGENCY: Canadian National Railways, 111C13806  
 INVESTIGATOR: Rennie, R  
 SPONSORING AGENCY: Canadian National Railways  
 STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1978 COMPLETION DATE: Dec. 1980  
 ACKNOWLEDGMENT: Roads and Transportation Association of Canada

## 00 196750

**NATM ALTERNATIVE DESIGN FOR CONSTRUCTION OF MT. LEBANON TRANSIT TUNNEL**

This project will provide an alternative design for the construction of Mt. Lebanon Transit Tunnel in Pittsburgh using the New Austrian Tunneling method (NATM) technology. Phase I includes detailed planning and pre-design investigations involving review of geotechnical details and finite element analysis of selected tunnel sections as an initial check of external loading and geologic conditions.

PERFORMING AGENCY: Port Authority of Allegheny County, PA-06-0052  
 INVESTIGATOR: Mundo, J Tel (412) 237-7377  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract PA-06-0052

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1980 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$460,000

ACKNOWLEDGMENT: UMTA

## 00 196751

**NON-DESTRUCTIVE TESTING FOR TUNNEL STRUCTURES**

To develop an effective non-destructive method for testing the structural integrity of tunnels. The project consists of three phases: 1) current NDT technology will be researched with the data compiled and evaluated, 2) laboratory tests to research methods and modifying or developing necessary instrumentation to successfully test brick, homogeneous concrete, reinforced concrete, concrete encased steel, concrete lined tunnel sections, and for defining voids behind these structures; 3) field instrumentation to carry out various test procedures established in Phase II.

PERFORMING AGENCY: Port Authority Trans-Hudson Corporation, NY-06-0078; New York City Transit Authority  
 INVESTIGATOR: Theofilos, LG Tel (201) 963-2701  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

CONTRACT NY-06-0078

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1979 COMPLETION DATE: Apr. 1983 TOTAL FUNDS: \$800,000

ACKNOWLEDGMENT: UMTA

## 00 196752

**ALLOCATION OF RISKS IN URBAN UNDERGROUND CONSTRUCTION**

This study will involve the development of a risk analysis methodology to evaluate the impact on owner's cost of alternative allocations of risks associated with geological site conditions among major project participants in urban underground construction. This methodology will be capable of handling all aspects of geological site uncertainty commonly encountered in such construction and of incorporating three or more parties in the analysis of risk allocations.

PERFORMING AGENCY: Massachusetts Institute of Technology, MA-06-0097  
 INVESTIGATOR: Levitt, RE Tel (617) 253-7118 Logcher, RD Ashley, DB  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract MA-06-0097

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1979 COMPLETION DATE: June 1981 TOTAL FUNDS: \$145,000

ACKNOWLEDGMENT: UMTA

## 00 303269

**VULNERABILITY OF TRANSPORTATION AND WATER SYSTEMS TO SEISMIC HAZARDS**

Lifeline engineering is the evaluation of the dependency of urban regions on their service systems. The essential features of lifelines are their geographical

extent and their redundancies, or lack thereof. The lifeline's geographic spread extends the area within which seismic damage may cause failure of an urban system; for the urban region involved, this is a magnification of seismic risk. Lifeline models will be developed which will permit the preparation of inverse iso-seismal maps for given lifelines; zones within which a shock of given magnitude will cause lifeline failure. The (integrated) value of earthquake frequency over the areas contained within the inverse iso-seismals (or the "damage areas") is a direct measure of seismic risk. The problem is particularly significant for areas in the east-central part of the United States. The lifeline models and earthquake risk calculations will be generated and performed for select major east-central cities. The techniques will be presented in a manner facilitating their use by other analysts. The results of the analyses of the selected cities will serve to illustrate the increased seismic risk encountered in a lifeline analysis (as opposed to an in-situ structural analysis) and the further increased relative risk for east-central areas.

PERFORMING AGENCY: Carnegie Mellon University, School of Fine Arts, Department of Architecture

INVESTIGATOR: Oppenheim, IJ

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, PFR75-20977 A04

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: June 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: \$105,120

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1582 2)

## 00 308310

**INTEGRATED DESIGN-CONSTRUCTION FOR TUNNEL SUPPORTS**

This award will provide incremental funding for NSF Grant DAR 77-09116 which had been previously reviewed and approved as a two-year continuing grant. The purpose of the research is to produce an integrated design construction procedure for the tunneling process. This procedure will be produced in the form of guidelines for practical application. The initial tasks for the first year have been completed on schedule. These include the development of: an empirical design process, analytical approaches, improved interpretation of ground-structure interaction and an on-site tunnel support testing program. Work during the second year will focus on the integration of results from on-site tunnel support tests with operational and contractual considerations. Included will be the completion of a simulation model and construction decision models based upon cost effectiveness and geologic parameters.

PERFORMING AGENCY: Massachusetts Institute of Technology, School of Engineering, Department of Engineering, DAR-7709116

INVESTIGATOR: Einstein, HH Tel (617) 253-3598

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, DAR7709116A01

STATUS: Active NOTICE DATE: July 1980 START DATE: Mar. 1979 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$169,497

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 00 308316

**SOIL AND BALLAST LABORATORY**

In view of the importance of the soil and ballast properties in railroad track design and construction, it is important for the Association of American Railroads (AAR) Technical Center to have a soil and ballast laboratory both for the evaluation of necessary material property information and for the conduct of ongoing research in this important area. A soil and ballast laboratory was set up jointly by the AAR and the Civil Engineering Department of the Illinois Institute of Technology, located next to the AAR Technical Center. Material characteristic tests were conducted at the laboratory for some track foundation materials. Student fellowship programs to sponsor graduate research on soil and ballast were also planned.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Leshchinsky, D Tel (312) 567-3599

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Leshchinsky, D Tel (312) 567-3599

In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: Feb. 1982



ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 308317

#### GROUND PENETRATING RADAR FOR TRACK FOUNDATIONS

In order to evaluate railroad embankments for the development of performance standards and for obtaining necessary data for condition surveys, information must be available on subsurface conditions. Soil borings, the traditional means of subsurface exploration, are expensive and time-consuming for railroads to incorporate into their maintenance programs. A promising alternative is the use of ground penetrating radar. Research was planned with the objective to field-test a ground penetrating radar for subsurface profiling of layers in the track subgrade.

#### REFERENCES:

Field Evaluation of a Ballast-Subgrade Radar System So, W; Hutcheson, TB; Breese, RF, RRIS Bulletin 8002, Apr. 1980, RRIS 00 312420

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Leshchinsky, D Tel (312) 567-3599

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Leshchinsky, D Tel (312) 567-3599

#### In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: Jan. 1982

ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 308318

#### USE OF ENGINEERING FABRICS TO IMPROVE TRACK PERFORMANCE

In recent years, it has been found empirically that placement of a single horizontal sheet of civil engineering fabric on top of a soft foundation of a track increases the support capacity of the foundation. However, the exact fabric behavior and thus the fabric properties required for proper design are not clearly understood. A project was initiated to review and summarize the current state of the art in civil engineering fabric use. The goal was to draw conclusions on the suitability of the methods available for fabric selection, and on current methods of construction relative to their operational adequacy and usefulness and to develop preliminary guidelines for the selection and use of civil engineering fabrics to obtain improved track performance. Several railway field sites where civil engineering fabric was tried on an experimental basis were visited and conversation with railway personnel responsible for the conduct of the field demonstration provided useful information.

#### REFERENCES:

Use of Geotechnical Fabric in Railroad Operation: A State-of-the-Art Study, Haliburton, TA, Feb. 1981

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Leshchinsky, D Tel (312) 567-3599

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Leshchinsky, D Tel (312) 567-3599

#### In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: Jan. 1982

ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 308321

#### DESIGN RECOMMENDATIONS FOR TRANSIT GUIDEWAYS

Prepare recommendations for design of elevated Transit Guideways; Scope: 1. Definition of Design Philosophy and limit State Concept; 2. Derivation of load and performance factors by a calibration process using probabilistic techniques similar to those used for the Ontario Bridge Code; 3. Integration of special structures, such as stations, switches, etc.; 4. Reference will be made to the OHBD Code in elements common to both bridges and guideways. The study will culminate in a set of design recommendations. Pertinent information will be supplied to American Concrete Institute Committees 358 (Concrete Guideways) and 443 (Concrete Bridge Design). Likewise, MTC will receive from them data for calibration purposes.

#### REFERENCES:

Review of Guideway Design Criteria in Existing Transit Dorton, RA; Grouni, HN, ACI Journal, Apr. 1978

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can, Transit Systems Research and Development Office, 31217

INVESTIGATOR: Grouni, H Billing, JR

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can, Transit Systems Research and Development

STATUS: Programmed NOTICE DATE: Feb. 1981 TOTAL FUNDS: \$56,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Can

00 309938

#### FATIGUE LIVES OF CRITICAL MEMBERS IN A RAILWAY TRUSS BRIDGE

The fatigue lives of critical members, such as hangers, floor beams and stringers, in a single track, riveted railroad truss bridge is being investigated for various unit freight trains, operating at different speeds. A partial bridge model is used, along with a three-car train, to determine the stress cycles. For determining the fatigue lives of critical members, four fully-loaded trains per day, are assumed to pass over the bridge. Each train is assumed to consist of one hundred, 70-ton cars or seventy, 100-ton cars.

PERFORMING AGENCY: Illinois Institute of Technology

INVESTIGATOR: Chu, KH Tel (312) 567-3542

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Jan. 1979 COMPLETION DATE: May 1980

ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 309940

#### AAR COMPUTER BRIDGE PROGRAMS

The AAR computer bridge programs are written in FORTRAN IV, and are intended to be used on a large scale computer, such as the IBM 360 or 370 and DEC-20 systems. A total of six programs are available, and are listed as follows: Program No. 1-Moment and Shear tables for Heavy Duty Cars on Bridges; Program No. 2-Analysis of Railway Truss Bridges; Program No. 3-Analysis of Pratt, Howe and Warren-type Railway Truss Bridges; Program No. 4-Rating of Railway Truss Bridges; Program No. 5-Analysis and Rating of Plate Girder Railway Bridges; Program No. 6-Analysis and Rating of Railway Bridge Floors. Programs No. 1, 2 and 3 have already been revised and updated to reflect the current AREA Specifications. Programs No. 4, 5 and 6 are in the process of being revised, and will be updated according to current AREA Specifications.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Singh, SP Tel (312) 567-3593

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

#### In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1978 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 309945

#### SIGNAL ENHANCEMENT INTERPRETATION FOR DETECTION OF FLAWS IN REINFORCING STEEL PRESTRESSED CONCRETE BRIDGE MEMBERS

To upgrade existing prototype FHWA magnetic field disturbance (mfd) system to incorporate improved signature acquisition and processing capability and to provide immediate readout of physical condition of reinforcing steel.

PERFORMING AGENCY: Southwest Research Institute

INVESTIGATOR: Kusenberg

SPONSORING AGENCY: Federal Highway Administration, Structures and Applied Mechanics Division

RESPONSIBLE INDIVIDUAL: McGogney

Contract 80-C-00002

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: Oct. 1979 COMPLETION DATE: Jan. 1981 TOTAL FUNDS: \$126,000

ACKNOWLEDGMENT: Federal Highway Administration (305029353)



00 309946

**PRETHAWING OF PERMAFROST BY SURFACE MODIFICATIONS**

To evaluate several different methods of solar heating for creating the deepest possible thaw zone during a one to two-year period prior to embankment construction.

PERFORMING AGENCY: Alaska Department of Transp and Public Facilities

INVESTIGATOR: Esch, DC Connor, BG Tel (907) 479-2241

SPONSORING AGENCY: Alaska Department of Transp and Public Facilities; Federal Highway Administration, Materials Division

RESPONSIBLE INDIVIDUAL: Fohs Chassie

HP&R 4000(1)F09142

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: Oct. 1979 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: \$41,000

ACKNOWLEDGMENT: Federal Highway Administration (325019351)

00 309948

**EVALUATION OF SITE EXPLORATION PREDICTIONS AND THE INSTRUMENTATION AND MONITORING OF SOFT GROUND TUNNELING**

Design experiments and instrumentation plans, laboratory and field tests, and analyze information developed at the Mt. Baker Ridge tunnel site to evaluate methods for site exploration to determine if newly developed methods are superior to conventional ways of predicting soil-tunnel interaction.

PERFORMING AGENCY: Shannon and Wilson, Incorporated

INVESTIGATOR: Douglass

SPONSORING AGENCY: Federal Highway Administration, Structures and Applied Mechanics Division

RESPONSIBLE INDIVIDUAL: Sallberg, JR

Contract DOT-FH-11-9665

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: Oct. 1979 COMPLETION DATE: Jan. 1984 TOTAL FUNDS: \$648,000

ACKNOWLEDGMENT: Federal Highway Administration (277039353)

00 316080

**DEVELOPMENT OF IMPROVED PROCEDURE FOR SIMULATION OF EXCAVATION AND APPLICATION**

Prediction of stability and integrity of excavated surfaces is an important engineering activity for tunneling, mining, or digging open cuts. Under this award an improved procedure based on the finite element method will be developed for simulation of underground and surface excavations. A number of factors that can cause difficulties in the implementation of the existing finite element procedure will be identified and analyzed on the basis of a comprehensive review of existing technology for analysis and design of underground structures. The proposed procedure will be based on the mixed finite element scheme, will include both stresses and displacements as unknowns, and will allow for strain-softening, loading and unloading, anisotropy and joints in the constitutive law, and effects of number of stages of excavations, and of existing structures. The numerical predictions will be compared with observations from available (field) tests. The results and the computer code will be detailed in order to facilitate applications for analysis and design of excavations and related structural elements.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, School of Engineering, Civil Engineering Department

INVESTIGATOR: Desai, CS

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, DAR77-20500

STATUS: Active NOTICE DATE: June 1980 START DATE: Sept. 1978 COMPLETION DATE: Feb. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (DO 465 1)

00 319917

**COUNTERMEASURES TO REDUCE BRIDGE LOSSES ATTRIBUTED TO SCOUR AND BANK EROSION**

This country has a vast inventory of bridges (about 50,000) over streams and most have been designed without the benefit of a good understanding of sediment transport phenomena. Man has been studying scour and erosion problems for as long as bridges have been built and will continue to do so

in the future which is indicative of the uncertainties that must have accompanied existing bridge designs. The uncertainties that affect the safety of a bridge are not restricted to the original design of the bridge itself. Any channelization of flood control project within a river basin could have considerable impact on the stability of bridge foundations within that basin. An even bigger problem is that of coping with natural river morphology which in essence naturally tends to destroy every man-made structure placed in a flood plain. Average annual expenditures for bridge losses during floods is over 20 million dollars from emergency relief funds alone. To develop guidelines to assist design, maintenance and construction engineers in identifying instability problems, indicates when and where such problems may occur and in selecting measures that can be used to reduce bridge losses attributable to scour and bank erosion. (1) Make an initial survey to determine the range of variables, bridge loss experience and current practices relative to countermeasures. (2) Establish a preliminary stream classification system to reference instability problems. (3) Identify problems that affect highway bridges and categorize their seriousness. (4) Survey current practices to determine what countermeasures are available and how effective they have been used. (5) Evaluate instability problems and countermeasures at selected sites. (6) Recommendations for future research and model testing. Case histories on hydraulic problems and countermeasures at 210 bridge sites have been written. Each case history includes geomorphic, hydrologic, and engineering data on the site, assignment of causes for the hydraulic problem, and (where possible) evaluation of the countermeasure used. Work has begun on summarizing the results. The project has been modified to include a study of the performance of channels straightened for purposes of bridge or highway construction.

PERFORMING AGENCY: Geological Survey, Water Resources Division

INVESTIGATOR: Brice, JC

SPONSORING AGENCY: Geological Survey, Water Resources Division, WR 76-153

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: July 1975 TOTAL FUNDS: \$22,443

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (DO 298 2)

00 324946

**STRESSES AND STRENGTH OF LONGITUDINAL GIRDERS AND CROSS GIRDERS OF BRIDGES**

In this investigation, the calculation methods used for the longitudinal girders of bridges and then those used for the cross girders, as adopted by the various railways, are in the first instance listed and compared. It is then planned to establish a simple uniform calculation method for each case which takes into account the actual stresses and the actual three-dimensional bearing performance of the longitudinal and cross girders and of their connections in a better manner than hitherto. For this purpose, measurements on existing bridges are taken and later the new calculation methods will be experimentally checked on large bridge components.

Question D154.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Lamla, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: June 1979

ACKNOWLEDGMENT: UIC

00 329565

**DESIGN AND SPECIFICATION MANUAL FOR STEEL BOX GIRDER TRANSIT STRUCTURES**

This project is to establish the Institute for Physical Science and Technology at the University of Maryland as a research center for elevated structure design. The project will develop an engineering design specification or standard for steel aerial structures, and to develop a design oriented computer program for use in the analysis of such structures.

PERFORMING AGENCY: Maryland University, College Park, MD-06-0076

INVESTIGATOR: Heins, C Tel (301) 454-3104

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Spencer, P Tel (202) 426-0090

CONTRACT UMTA-MD-06-0076

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1980 COMPLETION DATE: May 1982 TOTAL FUNDS: \$89,000

ACKNOWLEDGMENT: Maryland University, College Park



**00 329566****INVESTIGATION OF WASHINGTON METRO UNDERGROUND ENVIRONMENT**

This project consists of studies which will investigate and provide solutions to a number of structural problems within Washington Metrorail tunnels. Studies which are to be undertaken in this project include calcification analysis, hydrostatic pressure relief, acid water analysis, and water leakage and waterproofing. The project will develop answers to problems which may also prove useful for other transit authorities that have similar construction characteristics.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority, DC-06-0347

INVESTIGATOR: Garrett, V Tel (202) 637-1158

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, G Tel (202) 426-0090

**CONTRACT UMTA-DC-06-0347**

STATUS: Proposed NOTICE DATE: Feb. 1981 START DATE: Feb. 1981 COMPLETION DATE: Feb. 1982 TOTAL FUNDS: \$205,000

ACKNOWLEDGMENT: Washington Metropolitan Area Transit Authority

**00 329567****EVALUATION OF ROCK CHAMBER LINING PERFORMANCE--PORTER SQUARE STATION, MBTA**

To observe and evaluate the performance of the innovative thin lining support system used in the construction of the Porter Square Station. The project will be conducted using data collected from construction control instrumentation supplemented by observations and convergence measurements made during construction. Through this project the validity of the design approach can be assessed and compared for future chamber design and construction.

PERFORMING AGENCY: Massachusetts Bay Transportation Authority, MA-06-0127

INVESTIGATOR: Wey, G Tel (617) 722-5914

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, G Tel (202) 426-0090

**CONTRACT UMTA-MA-06-0127**

STATUS: Proposed NOTICE DATE: Feb. 1981 START DATE: Feb. 1981 COMPLETION DATE: Feb. 1983 TOTAL FUNDS: \$215,000

ACKNOWLEDGMENT: Massachusetts Bay Transportation Authority

**00 329568****RESEARCH MAPPING DURING EXCAVATION OF WASHINGTON METRORAIL SECTION B-9**

To provide an in-depth description of the characteristics of the geological material encountered during excavation including stand-up time, effect of water, and effect of excavation procedures during the excavation of Section B-9 of the Washington Metrorail system. The data developed during the study will be compared with similar materials encountered in other excavation projects with the final report containing a discussion on how weathering materials from regional metamorphic rocks can be described in terms of engineering behavior and excavated.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority, DC-06-0343

INVESTIGATOR: Garrett, V Tel (202) 637-1158

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, G Tel (202) 426-0090

**CONTRACT UMTA-DC-06-0343**

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1981 COMPLETION DATE: Jan. 1983 TOTAL FUNDS: \$55,000

ACKNOWLEDGMENT: Washington Metropolitan Area Transit Authority

01 038973

**RAILROAD TRACK STRUCTURE RESEARCH**

The Transportation Systems Center (TSC) and The Association of American Railroads (AAR), the contractor, entered into a program to perform specific experiments related to Track Structure Research. The program used the Track Laboratory of the AAR which include a consolidation vehicle to study the effect of consolidation on vertical track modulus and lateral track strength. Additional experiments looked into the gage widening phenomenon and lateral track strength under various shoulder widths.

**REFERENCES:**

Widening Tests: Cycle Load Influence Choros, J, Technical Memo

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zarembski, AM Tel (312) 567-3622 Choros, J Tel (312) 567-5795

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kish, A Tel (617) 494-2649

Contract DOT-FR-30038 (CR)

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Feb. 1980 TOTAL FUNDS: \$823,097

ACKNOWLEDGMENT: Association of American Railroads Technical Center

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 et al, Available from NTIS, May 1975, PB-250547/AS

An Experimental Evaluation of Techniques for Measuring the Dynamic Compliance of Railroad Track, Nessler, GL et al, Available from NTIS, July 1978, PB-285559/AS

Design and Analysis of a Track Compliance Measurement System, Kaiser, WD, Nov. 1978, PB-297055/AS

PERFORMING AGENCY: Battelle Memorial Institute

INVESTIGATOR: Prause, RH Tel (614) 424-4505

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: O'Sullivan, WB Tel (202) 426-4377

Contract DOT-FR-30051 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1973 COMPLETION DATE: 1983

ACKNOWLEDGMENT: TRAIS (PR # RP-39)

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: Aug. 1980 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: McCown, RJ Tel 202-426-1227

STATUS: Active NOTICE DATE: Feb. 1980 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 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. Research activities address track geometry measurement, rail flaw detection and track signal assessment systems and ancillary equipment.

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. 1980 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. The first of the new design vehicles will be ready in February 1981.

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. 1980 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: Feb. 1981 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: Feb. 1981 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: Feb. 1981 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138568

**COOPERATIVE RESEARCH PROGRAM ON TIMBER CROSS TIE DEVELOPMENT**

Used oak railroad ties were chipped, flaked, and screened by the Forest Products Laboratory to provide face and core furnish for 11 reconstituted ties. The material was fabricated by Potlatch Corporation, Lewiston, Idaho, into flakeboards approximately 0.7 inch thick, and further laminated into 7 x 9 inch x 8 foot ties, each containing 10 laminations. The outer two layers on each face were characterized by oriented flakes, while the inner layers were made using a random-felting technique. Preliminary testing showed the ties to have an apparent modulus of elasticity (MOE) of 900 K psi and a modulus of rupture (MOR) of 3,000 psi. This was approximately 80 and 60 percent, respectively, of the stiffness and strengths of previous ties made under laboratory conditions. Lower bending properties were attributed to less face-flake alignment and poorer resin distribution. Changes in flake fabrication, adhesive application, and alignment techniques have been suggested to improve the performance of the industrially manufactured ties.

Approximately 18 hardwood Press-Lam crossties (thick, rotary-cut, press-dried, parallel laminated veneers) were manufactured under laboratory conditions and placed in track service for evaluation. All have performed satisfactorily for a period of from 3-5 years.

**REFERENCES:**

PERFORMING AGENCY: Forest Products Laboratory; Association of American Railroads Technical Center

INVESTIGATOR: Geimer, RL Tel (608) 257-2211 Youngquist, JA

SPONSORING AGENCY: Forest Products Laboratory

RESPONSIBLE INDIVIDUAL: Youngs, RL Tel (608) 257-2211

STATUS: Active NOTICE DATE: Aug. 1979 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 preliminary 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 influencing stress state may be determined.

**REFERENCES:**

Preliminary Description of the Stresses in Railroad Rails Johns, TG; Davies, KB, FRA-ORD-76-294

Preliminary Report on Stresses in Railroad Rail at Bolted Joints, Johns,

TG; Davies, KB

Engineering Analysis of Stresses in Railroad Rails Sampath, SG et al

PERFORMING AGENCY: Battelle Columbus Laboratories

INVESTIGATOR: Sampath, S Tel (614) 424-4597

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Transportation Systems Center, Office of Ground Systems

RESPONSIBLE INDIVIDUAL: McConnell, DP Tel (617) 494-2596

Contract DOT-TSC-1038

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1975 TOTAL FUNDS: \$429,000

ACKNOWLEDGMENT: FRA

#### 01 148355

##### ROAD MAINTENANCE COST MODEL-PHASE III

Development of wear models and cost functions for the replacement and cyclic track surfacing maintenance activities and an investigation of replacement value costing procedures for rails, ties and ballast so that the Road Maintenance Cost Model computer can predict both maintenance cycles and appropriate unit charges for any given traffic mix and track type.

##### REFERENCES:

Road Maintenance Cost Model Phase I-Rail Wear Modelling Roney, MD; Lake, RW; Schwier, C; Turcot, MC, Canadian Institute of Guided Ground Transport, May 1978

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-823

INVESTIGATOR: Roney, MD Tel (613) 547-5777 Birk, M Lake, RW McIlveen, ER Turcot, MC

SPONSORING AGENCY: Department of Transport, Canada

RESPONSIBLE INDIVIDUAL: Hawryszko, JW Tel (613) 992-9197

CONTRACT DGSR-15

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$39,260

ACKNOWLEDGMENT: CIGGT

#### 01 170600

##### THE ELECTROSLAG WELDING OF RAIL STEELS

The first research phase has seen the establishment of the preparation, set-up and operating parameters that are necessary to achieve good weld penetration over the full cross section in standard carbon rails. 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 characteristics of the thermit welding method.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-775

INVESTIGATOR: Cameron, J Tel (613) 547-5908 Mackay, WBF

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific Rail; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Rennie, R Tel (514) 877-4337 Tufts, LD Tel (514) 861-6811 Dillon, R Tel (514) 283-4429

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Nov. 1977 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: \$167,262

ACKNOWLEDGMENT: CIGGT

#### 01 170616

##### TRACK STRENGTH CHARACTERIZATION PROGRAM

The purpose of this 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 by using a track strength vehicle to measure the track integrity to lateral applied loads.

##### REFERENCES:

Preliminary Outline Track Strength Characterization Programs, Zarembski, AM, Sept. 1977

Track Strength Characterization Task Plan May 1978

Measurement of Gauge Restraints: Rail Spreader Tests Zarembski, AM, Dec. 1978

Preliminary Field Evaluation of a Track Strength Test Vehicle, Zarembski, AM; McConnell, DP; Lovelace, WS

Field Evaluation of Mainline Quality Track Using a Track Strength Test Vehicle, Zarembski, AM; Choros, J

PERFORMING AGENCY: Association of American Railroads Technical Center, K103

INVESTIGATOR: Zarembski, AM Tel (312) 567-3622 Choros, J Tel (312) 567-5795

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Zarembski, AM Tel (312) 567-3622

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 01 170649

##### OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC

The studies of the relationship between traffic, track geometry and damage to stock have been completed. The optimisation of levelling and alignment operations has been studied: after an analysis of the work of tamping machines in Report No. 10 of October 1978, the Committee is preparing a report on the reliability of maintenance machines. The possibilities of improving the ballast by using chemical products are described in Report No. 11 of October 1978. Report No 12 of April 1979 shows the effectiveness of dynamic stabilisation of the ballast in restoring the lateral resistance of the track after a maintenance operation. The study of the hydraulic performance of track bed structures is described in Report No. 13 of October 1979; this study involved full-scale tests. Laboratory tests showing the influence of the water content on various soils will be the subject of Report No. 14 which is to be presented in September 1980. The influence of frost on track bed structures is dealt with in Report No. 15 which is to be presented in September 1980. Several other reports are in preparation based on Laboratory tests or in situ tests, the object being to define the dimensioning of railway track bed structures.

Thirteen reports have been published to date. Question D117.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Wattecamp, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 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 viscoplastic 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: Delaware University, Newark, Department of Civil Engineering

INVESTIGATOR: Kerr, AD

SPONSORING AGENCY: National Science Foundation, Directorate for Engi-



neering and Applied Sciences, ENG 78-25433

STATUS: Active NOTICE DATE: July 1980 START DATE: Dec. 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6620)

#### 01 185232

##### LIFE CYCLE COST METHODOLOGY FOR THE EVALUATION OF PROPOSED TRACK-RELATED SAFETY STANDARDS

This contract is concerned with evaluating economic effects of proposed safety standards that are related to railroad track. The objectives of the contract are to develop a methodology for assessing the economic impact of alternative standards, to define the data requirements and functional relationships for the methodology, and to develop the appropriate data elements. The contract also involves application of the methodology to a set of proposed standard modifications.

PERFORMING AGENCY: Shaker Research Corporation

INVESTIGATOR: Krauter, AI Tel (518) 877-8581

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Smith, RA Tel (617) 494-2795

Contract DOT-TSC-1594

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: \$73,982

ACKNOWLEDGMENT: Shaker Research Corporation

#### 01 185233

##### TECHNICAL SUPPORT SERVICES FOR TRACK STRUCTURE FAILURE STUDIES

Support services will be furnished in response to Technical Task Directives in areas of (1) Track Loads, (2) Track Structural Analysis, (3) Component Stress and Failure Analysis, (4) Laboratory Field Experimentation, and (5) Technical Liaison.

PERFORMING AGENCY: Battelle Memorial Institute, G6632

INVESTIGATOR: Meacham, HC, Jr Tel (614) 424-4484

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: McConnell, DP

Contract DOT-TSC-1595

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: July 1981 TOTAL FUNDS: \$465,545

ACKNOWLEDGMENT: Battelle Memorial Institute

#### 01 188649

##### MAINTENANCE-OF-WAY PLANNING PROGRAM

A cooperative Maintenance-of-Way (MOW) Research Program between Conrail and FRA, which utilizes data from FRA's Track Geometry inspection vehicles and other related track data (traffic, physical, etc.) for MOW planning evaluation. Contractor to determine the contribution of selected set of physical and traffic parameters to the rate of deterioration of track and select the appropriate indicator(s) (track quality index), that can be calculated from data collected by a track geometry measuring vehicle, that will measure the quality of track.

##### REFERENCES:

A Prototype Maintenance-of-way Planning System-Volume I Final Report (including Appendices A through E), Hamid, A; Sawyer, D; Kenworthy, MA; Rasmussen, K, Available from NTIS, FRA/ORD-80-47.1, Nov. 1980

PERFORMING AGENCY: ENSCO, Incorporated, 437

INVESTIGATOR: Kenworthy, MA Tel (703) 960-8500

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

Contract DOT-FR-64113

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1978 COMPLETION DATE: Feb. 1981 TOTAL FUNDS: \$469,215

ACKNOWLEDGMENT: FRA

#### 01 188658

##### RAILROAD TRACK STRUCTURES RESEARCH

This program of Railroad Track Structures Research is expected to encompass a number tasks for research into a variety of technical factors affecting railroad track and related systems and subsystems. The initial

portion of the Railroad Track Structures Research Program shall consist of a series of tests conducted at the AAR Truck Structures Dynamic Test Facility Chicago Illinois. Additionally, data analysis and model validation is called for.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zarembski, AM Tel (312) 567-3622

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kish, A Tel (617) 494-2649 Herlihy, J Tel (617) 494-2579

Contract DOT-TSC-1541

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1979 COMPLETION DATE: June 1981 TOTAL FUNDS: \$316,190

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 01 193778

##### INSTALLATION AND TESTING OF THE TRACK GEOMETRY MEASUREMENT SYSTEM

To install rail geometry sensing, recording and analysis package furnished by TSC on a standard car belonging to the NYCTA. Test operation and reliability of the equipment over a two year period by systemwide use.

PERFORMING AGENCY: New York City Transit Authority

INVESTIGATOR: Gamache, LW Tel (212) 330-3757 Lapinski, R

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Nickles, JE Tel (617) 494-2204

Contract DOT-TSC-1635

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Dec. 1978 TOTAL FUNDS: \$45,000

ACKNOWLEDGMENT: New York City Transit Authority

#### 01 196723

##### FEASIBILITY OF TRACK MODULUS MEASUREMENT FROM MOVING VEHICLE

To provide better information on track strength to enable improved allocation of maintenance resources, the feasibility will be determined of measuring track modulus under dynamic conditions and, if feasible, develop electronic hardware and software to measure this property of track and analyze data. This will provide improved information on track strength to enable better allocation of maintenance resources.

PERFORMING AGENCY: Canadian National Railways, U11C13804

INVESTIGATOR: Rennie, R

SPONSORING AGENCY: Canadian National Railways

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1978 COMPLETION DATE: Dec. 1982

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 01 196728

##### AIR CURTAIN SWITCH PROTECTOR

To develop a qualified prototype based on laboratory patented feasibility model of the air curtain switch. Construction and testing of switch units in a working environment.

PERFORMING AGENCY: Ministry of State for Science and Technology, F35B10001

INVESTIGATOR: Ringer, TR

SPONSORING AGENCY: Ministry of State for Science and Technology

STATUS: Active NOTICE DATE: July 1979 START DATE: June 1976 COMPLETION DATE: Dec. 1999

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 01 196735

##### TRACK STRUCTURES RESEARCH

To evaluate the fatigue life and economic life of track structures and components, a track structure test facility at CN Rail's Research Centre is used to evaluate the fatigue life of track structures and components, to develop tools for measurement of centre binding of concrete ties, to evaluate effects of frost heaving in the creation of centre bound track, to develop and evaluate methods for measuring thermal stress in welded rail and to evaluate variation in measurement of track modulus. The goal is to optimize the railway track structure for present and future rail operations and to provide for improved placement of capital and maintenance resources in maintaining the railway fixed plant (track).

PERFORMING AGENCY: Canadian National Railways, 111C13807  
 INVESTIGATOR: Rennie, R  
 SPONSORING AGENCY: Canadian National Railways

STATUS: Active NOTICE DATE: Feb. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 01 196737

##### ROADWAY SYSTEMS ANALYSIS

Study all of the factors which contribute to the deterioration of the roadway, to increase scientific knowledge of this phenomenon, and as a result to develop improved roadway and track elements and improved maintenance technology. Study a large collection of data on existing roadway and track elements, for the whole of a large railroad, together with train operations, maintenance applied and historic measurements of roadway and track conditions. A large computer software system has been developed to facilitate these studies, which are currently underway.

PERFORMING AGENCY: Canadian Pacific Limited, 111H54851  
 INVESTIGATOR: Holt, R  
 SPONSORING AGENCY: Canadian Pacific Limited

STATUS: Active NOTICE DATE: July 1979 START DATE: Jan. 1978 COMPLETION DATE: Jan. 1983

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 01 308309

##### CONCRETE TIE AND FASTENER PERFORMANCE AND CORRELATION ANALYSIS

Evaluate the performance of concrete and wood tie track at FAST and four revenue service sites to determine FAST track correlation with Revenue Service track. This evaluation would be based upon the results of visual inspections and analysis of data from track instrumentation. FAST and Revenue Service Track performance will be made by direct comparison, regression analysis and analytical simulation.

##### REFERENCES:

Measurement and Correlation Analysis Plan for Concrete Tie and Fastener Performance Evaluation, Dean, FE; Prause, RH; Harrison, H; Selig, ET, Nov. 1979

PERFORMING AGENCY: Battelle Columbus Laboratories  
 INVESTIGATOR: Prause, RH Tel (614) 424-6424 Harrison, HD Selig, ET

SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Moody, HG Tel (202) 426-4377

Contract DOT-FR-8164

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1979 COMPLETION DATE: Nov. 1982 TOTAL FUNDS: \$1,102,777

ACKNOWLEDGMENT: FRA

#### 01 308315

##### BALLAST CHARACTERISTICS AND SELECTION

To ensure good track stability and economical maintenance, a good ballast is of major importance. The need for high quality ballast has become increasingly important because of the rising volumes of traffic, heavier wheel loads and higher speeds. Consequently, a review of the state of the art of ballast selection was undertaken. The review attempted to identify the different requirements in making proper ballast selection other than the minimum requirements in the AREA specification.

##### REFERENCES:

Ballast Characteristics and Selection: the State of the Art, So, W, Dec. 1979

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: So, W Tel (312) 567-3599

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: So, W Tel (312) 567-3599

In-House

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Sept. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 01 308319

##### MAINTENANCE OF WAY: TRACK LAYING SYSTEMS (TLS) ECONOMICS AND ECONOMICS OF WOOD TIE REUSE; PHASE 2

This project is a continuation of the Phase I effort under Contract DOT-FR-8046. This project will complete the analysis of Track Renewal Systems and Wood Tie Reuse by emphasis on the development of an overall economic analysis framework for comparing the track renewal system of track maintenance and the traditional selective maintenance system, along with the net economic effect that wood tie disposal would have on the overall economics of using track renewal systems.

##### REFERENCES:

Track Renewal Systems: A Survey Report Cataldi, GR; Elkaim, DN; Larsen, KW, FRA/ORD-79/43, July 1979, PB-300866/AS

Wood Tie Reuse: A Survey Report Cataldi, GR; Elkaim, DN; Larsen, KW; Elliott, P, FRA/ORD-79/44, Aug. 1979, PB80-114044

Track Renewal System and Wood Tie Reuse Analysis Cataldi, GR; Elkaim, DN, FRA/ORD-80-63, Oct. 1980, PB81-125510

PERFORMING AGENCY: Unified Industries, Incorporated  
 INVESTIGATOR: Cataldi, GR Tel (703) 750-3282 Elkaim, DN  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Orth, CL Tel (202) 755-1877

CONTRACT DOT-FR-9044

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Aug. 1979 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$177,747

ACKNOWLEDGMENT: FRA

#### 01 308639

##### DEVELOPMENT OF GUIDELINES FOR THE USE, DESIGN AND INSTALLATION OF RESTRAINING RAIL ON TRANSIT TRACK

This research effort identified and evaluated all of the significant factors relating to the use of restraining rails in rapid transit tracks (heavy rail systems) in the U.S. It included operational, economic, and environmental considerations as well as dynamic forces and structural factors. The end product of the study was guidelines intended to optimize design and installation of restraining rail.

PERFORMING AGENCY: ENSCO, Incorporated  
 INVESTIGATOR: Cunney, EG Tel (703) 960-8500  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1771

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Aug. 1979 COMPLETION DATE: Jan. 1981 TOTAL FUNDS: \$136,902

ACKNOWLEDGMENT: TSC

#### 01 319076

##### RAILWAY APPLICATIONS OF GEOTECHNICAL FABRICS--LITERATURE SEARCH AND SYNTHESIS

A literature search and synthesis was undertaken as the initial step in a more comprehensive program of research on railway applications of geotechnical fabrics. (see CIGGT project summary for PRO-939-"Railway Applications of Geotechnical Fabrics") The literature synthesis will provide a base upon which to develop new experimental programs investigating fabric properties and applications.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-931

INVESTIGATOR: Fitzpatrick, C Tel (613) 547-5777

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Rowan, WG

CONTRACT 4094

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Jan. 1980 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: \$8,638

ACKNOWLEDGMENT: CIGGT

#### 01 319077

##### EXTENSION OF CN WEIGHTING MATRICES

Use of CIGGT Rail Wear Model to prepare rail life, type factor and speed factor weightings to be used by CN for allocation of M/W Costs. Weightings vary with car type, speed, degree curvature, rail type (jointed or CWR).

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-914

INVESTIGATOR: Birk, AM Tel (613) 547-5777 McIlveen, ER

SPONSORING AGENCY: Canadian National Railways

RESPONSIBLE INDIVIDUAL: Hanks, WG Tel (514) 877-5386

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Apr. 1980 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$4,663

ACKNOWLEDGMENT: CIGGT

#### 01 319079

##### STABILIZATION OF RAILROAD TRACK SYSTEMS USING GEOTEXTILES

Research centers on extensive monitoring of the response of rail track systems stabilized with commercial geotextiles. Long term performance data is being obtained to quantify fabric abrasion due to service and tamper vibrations. Parallel program of finite element analysis will use measured data as benchmark. Extrapolation to general subgrade conditions will then be made utilizing numerical analysis.

PERFORMING AGENCY: Civil Engineering & Applied Research, Incorporated

INVESTIGATOR: Richardson, GN Tel (919) 851-6260 Hulsey, LJ

SPONSORING AGENCY: Monsanto Triangle Park Development Center, Inc; Southern Pacific Transportation Company

RESPONSIBLE INDIVIDUAL: Knudson, P Newby, J

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1977

ACKNOWLEDGMENT: Civil Engineering & Applied Research, Incorporated

#### 01 319916

##### STUDY OF HOMOPOLAR PULSE RESISTANCE WELDING PARAMETERS FOR RAILROAD RAILS AND AUTOMOTIVE PARTS

Welding is one of the basic joining processes for metal fabrication and is vital to almost all industrial processes. Recent studies at the University of Texas at Austin have shown that the very high current peaks of a homopolar generator can be harnessed for resistance welding. This megajoule (and gigajoule) pulsed power source provides the potential for resistance welding beyond current capabilities. This very high-current, low-voltage generator makes it possible to resistance weld very large cross-sectional areas and permits new design approaches to the fabrication of products. The initial research that established the feasibility of using a homopolar generator for resistance welding was funded by the Division of Applied Research with a National Science Foundation Grant (DAR 77-23874). This research builds upon these previous results and is studying those variables for a welding process for industrial consideration. The variables of the welding parameters for the joining of railroad rails and automotive components are being studied and used as examples to determine if the resultant process is industrially cost-effective.

This Technology Innovation Project is being cost shared with the Federal Railroad Administration, the Association of American Railroads, General Motors Corporation, and Ford Motor Company.

PERFORMING AGENCY: Texas University, Austin, Department of Mechanical Engineering

INVESTIGATOR: Rylander, HG

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, ISP80-05918

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Mar. 1978 COMPLETION DATE: Feb. 1982 TOTAL FUNDS: \$343,345

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (DL 164 2)

#### 01 324948

##### STUDY OF MEANS TO IMPROVE THE QUALITY OF RAILS

The object is to define practical measures enabling a better straightness of the rails to be obtained and thereby an improvement of the geometric quality of the track. The investigations, conducted in the works and in the rail depots, involve statistical study of the faults occurring during alignment and welding. Existing rail quality control systems are compared with a view to arriving at recommendations concerning the automatic control of rails. The performance of rails in the track is studied for determining the maximum permissible faults in relation to maintenance operations, for determining the influence of periodic faults, and for evaluating the cost of maintenance as a function of the rail faults. In addition, the Committee has conducted an enquiry into means of improving the rail quality.

Question D148. Two reports have been published to date.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: 1978

ACKNOWLEDGMENT: UIC

#### 01 324950

##### DEVELOPMENT OF APPARATUS FOR MEASURING THE LONGITUDINAL FORCE IN RAILS LAID IN THE TRACK

The ORE D 150 Specialists Committee was charged with investigating the possibility of finding a practical method for determining the longitudinal force in rails. The ideal specification for the apparatus has been prepared and several techniques for non-destructive force measurements have been investigated. In addition methods of measuring rail temperature have also been studied. A majority of the systems considered have been rejected either due to practical problems or due to the fact that they can only measure surface strains. Two of the investigated techniques have been selected for further development, rail flexural response and magnetic parametric methods. The third technique based on magneto-mechanical acoustic emission is being kept in reserve.

Question D150.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Korpanec, I Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: Feb. 1979

ACKNOWLEDGMENT: UIC

#### 01 329553

##### AAR USE OF RMCM

Evaluation of data resources of up to three U.S. railroads (to be designated by the AAR) in the light of the CIGGT Rail Wear Model in the form developed in conjunction with the Track/Train Dynamics program. Calibration, validation and improvement of the Rail Wear Model so that it can be applied to track maintenance costing and planning activities in the U.S. rail system. Specific effort will be directed toward the characterization of track maintenance costs by the categories of rail, ties and other track maintenance.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-022

INVESTIGATOR: McIlveen, ER Tel (613) 547-5777 Lake, RW Birk, AM

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Hargrove, MB Tel (202) 293-5027

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1980 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$35,000

ACKNOWLEDGMENT: CIGGT

#### 01 329554

##### CN ENGINEERING USE OF RMCM

First phase of what is expected to be a continuing project employing the CIGGT Rail Wear Model to predict rail life cycles and to investigate the effect of different rail metallurgies, lubrication and grinding on these rail life cycles. Data from the CN Ashcroft Subdivision, a high curvature, heavy traffic region, is used as a basis for this investigation.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-006

INVESTIGATOR: McIlveen, ER Tel (613) 547-5777 Birk, AM

SPONSORING AGENCY: Canadian National Railways

RESPONSIBLE INDIVIDUAL: Fields, N Tel (514) 877-5572

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1980 TOTAL FUNDS: \$6,470

ACKNOWLEDGMENT: CIGGT

#### 01 329559

##### INDUSTRIAL ENGINEERING SUPPORT FOR TRANSIT TRACK MAINTENANCE

The objective of this project is to improve transit track maintenance and maintenance work productivity. It is anticipated that the results and knowledge obtained at WMATA under this project will be transferable to

other properties, with appropriate modifications to suit local conditions. The project will be performed over a period of 32 months, and will have three phases: (1) Track Maintenance Management Information System (TMMIS) Development and Installation, (2) Training, and (3) Evaluation. The final phase is to include an integrated package, Industrial Engineering Support for Transit Track Maintenance, for use by other properties.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority  
INVESTIGATOR: O'Donnell, TJ Tel (301) 589-2872

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Fatch, M Tel (202) 426-0090

CONTRACT UMTA-DC-06-0333

STATUS: Proposed NOTICE DATE: Feb. 1981 START DATE: Apr. 1981  
COMPLETION DATE: Dec. 1983 TOTAL FUNDS: \$1,250,000

ACKNOWLEDGMENT: Washington Metropolitan Area Transit Authority

01 329560

#### **MAINTENANCE-OF-WAY LONG-TERM PLANNING TECHNIQUE DEVELOPMENT PROGRAM**

To expand the Maintenance-of-Way (MOW) Research generated under Federal Railroad Administration Contract DOT-FR-64113, Task 437, and develop a long-term MOW planning evaluation technique that utilizes FRA's track geometry cars and other related track (traffic, physical, maintenance, etc.) data and in turn develop an analytical basis for planning expenditures for basic maintenance for standard track. A two phase 32 month program has been planned. Phase I is scheduled to be completed in approximately 8 months.

PERFORMING AGENCY: Little (Arthur D), Incorporated, 85721

INVESTIGATOR: Bing, A Tel (617) 864-5770

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

CONTRACT DOT-FR-53-80-C-00024

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1980  
TOTAL FUNDS: \$733,520

ACKNOWLEDGMENT: FRA

01 329564

#### **EVALUATION OF TRACK FIXATION SYSTEM NOISE REDUCTION MEASURES IN EXISTING SUBWAYS**

This project is providing a systematic study of reducing patron noise exposure in railcars and in stations through in-service prototype installation and testing program regarding the use of resilient rail fastening systems including direct fixation on concrete invert, concrete ties on ballast, and resiliently supported ties on concrete invert and to evaluate the structural behavior of the track structures. The results of this study can be applied to design considerations for new and/or rehabilitation of existing systems.

PERFORMING AGENCY: Chicago Urban Transportation District, IL-06-0042

INVESTIGATOR: Bolden, J Tel (312) 744-6772

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, G Tel (202) 426-0090

CONTRACT UMTA-IL-06-0042

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Apr. 1978  
COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$700,000

ACKNOWLEDGMENT: Chicago Urban Transportation District



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: Hawthorne, KL Tel (312) 567-3584

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. 1981 START DATE: July 1976 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: \$2,300,000

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: Completed NOTICE DATE: Feb. 1981 START DATE: July 1975 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$10,984,236

ACKNOWLEDGMENT: FRA

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: Bakken, G Tel (303) 697-4500

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Tsai, NT Tel (202) 426-0855

CONTRACT DOT-FR-742-4277

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$4,006,244

ACKNOWLEDGMENT: FRA

02 139178

**FACILITY FOR ACCELERATED SERVICE TESTING (FAST)**

FAST provides a controlled environment for accelerated service testing of track and rolling stock components and systems. The objective of the testing is to provide the railroad industry with timely and significant technological findings which improve safety, increase performance, and reduce costs. The FAST Track is a 4.8 mile loop divided into 22 sections, with experiments on rail metallurgy, ties (hardwood, softwood, concrete, steel), ballast (different materials, depth, shoulder width), etc. The FAST consist is made up of 4-axle locomotives pulling a 9,500-ton train of mostly 100-ton cars. The train averages 42 mph around the loop for 16 hrs/day, five day/week. The other 8 hrs/day is used for maintenance and measurements. Operations began September 1976. As of January 1, 1981, 540 MGT and 314,000 miles have been accumulated. FAST includes a system for management and control of test data, conducting appropriate data analysis and evaluation, and the reporting of results.

As of January 1, 1981, FAST has published five formal Technical Reports and 35 Technical Notes and Test Memorandums. Several additional reports are currently in preparation.

PERFORMING AGENCY: Federal Railroad Administration, Transportation Test Center

SPONSORING AGENCY: Federal Railroad Administration, Transportation Test Center; Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: McIntosh, GP Tel (303) 545-5660 X501

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1976 COMPLETION DATE: Aug. 1982

ACKNOWLEDGMENT: FRA

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: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Feb. 1981 TOTAL FUNDS: \$203,000

ACKNOWLEDGMENT: TSC

02 170644

**PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS**

At its 84th meeting in October 1979 the ORE Control Committee approved a two-year extension of the period of investigation. There were mainly 2 reasons why the B 55 Committee had applied for an extension, namely: the recommendations set out in RP 6 for the construction of vehicles are considered too stringent when applied to the existing rolling stock; taking into account the frequency of derailments caused by distorted track in actual service. This contradictory state of affairs required clarification for legal and economic reasons; furthermore, investigations with a view to formulating recommendations for track cant as a function of curve radius had proved to be very difficult and tedious, because the varying conditions on the different railways made it difficult to find a common factor. By extensive evaluation

of test results, statistical investigations, as well as the development of a complementary model of probability theory for the estimation of derailment frequency, it has meanwhile been possible to apply more realistic conditions to existing rolling stock, thus facilitating the design and maintenance of vehicles, without reducing safety. All this leads to recommending  $u = f(r)$  as a practical solution, including as it does track distortion, and not only covering actual track conditions but also demonstrating compatibility with the vehicle. Judging from the current position of work, the B 55 Committee should be able to conclude most of its investigations this year. After the relevant departments and the testing stations of the member Railways have checked the results, the final version of the final report of the B 55 question should be prepared and submitted in 1981.

Seven reports have been published to date. Question B55.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Schenk, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1965 COMPLETION DATE: Sept. 1981

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. The synthesis Report No. 15 contains the most significant results of the starting and braking force measurements, carried out on different railway bridges. The experimental and theoretical studies of the different parameters have led to the establishment of new rules permitting the performance of railway bridges to be better defined taking into account the starting and braking forces. The study has primarily been focused on the following parameters: the vertical load, the opponent coefficient of adhesion, the influence of rails, the type of bearing devices and the length of the bridge structures.

Sixteen 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: Dec. 1980 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 optimisation of track parameters. These long-term tests will not be completed until 1981; they consist in studying the wear of wheels with a given profile running on tracks laid with cant of 1/20, 1/30 and 1/40.

Nine 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: Dec. 1980 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 02 170657

##### EFFECT ON THE TRACK OF RAISING THE AXLE LOAD FROM 20 TO 22 T

For dealing with the problem of the effect on the track of raising the axleload from 20 to 22 t, the D 141 Committee, in conformity with its Programme of Work, simultaneously carried out the following studies: 1) A statistical study of the evolution of rail fatigue defects as a function of the axleload.

This study has been dealt with in Report D 141/RP 1; 2) Simulation tests by BR and PKP. These have been dealt with in Report D 141/RP 2; 3) Tests on the VELIM circuit, organised jointly between the D 141 and B 142 Committees, for 3 series of tests with 50 Mt, with 22 t axleload. The description of these tests and the account of the results obtained are dealt with in the appended Report D 141/RP 3. Compared with the runs at 20 t axleload carried out earlier at VELIM the tests on the same circuit with the running of a train loaded to 22 t axleload did not reveal any new phenomena which could have resulted in a fatigue stressing of the track leading to failure. However, a quantitative comparison of the results will only be possible at the end of the 22 t axleload tests. It is for this reason that it is planned to carry out two tests of 50 Mt with 20 t axleloads on the VELIM circular test track.

Three reports have been published to date. Question D141.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

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) confirmation of the S value given by Prud'homme for a single axle (RP 1) and for a bogie (RP 4). No significant effect of speed (RP 5); 2) Y/Q is an important parameter but it is not the only one involved; the duration of application of Y and the angle of attack also have to be taken into account. Several tests in progress will be treated statistically. Line tests are essential. 3) by calculations and bench tests. Development of an analytical method which is simpler than the finite element method. Fairly close agreement between the calculated results and the bench measurements in spite of the fact that it was impossible to take into account the stresses in the Hertzian zone (RP 2). Study of the influence of various parameters: sleeper spacing, track stiffness, type of rail (RP 6).

Six reports have 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: Dec. 1980

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. A fifth task was added in 1979: advanced freight car research.

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. 1979 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

Task will integrate and apply analytical and 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: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

## 02 196722

### RAILWAY TEST FACILITIES

In response to a recommendation of the RAC/TDC Railway Advisory Committee TDC funded a conceptual definition study on a Canadian Guided Ground Transport Test Centre. A questionnaire was distributed to manufacturers, railways, governments, universities and research organizations to ascertain the needs of the industry and a conceptual definition of a rail test track centre developed. Currently an in-house study on an environmental test facility is underway as a study separate from the test track centre. Work still continues on the final report on the test track centre, with emphasis being placed on the benefit/cost analysis.

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A54102

INVESTIGATOR: McClaren, W

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1977 COMPLETION DATE: Mar. 1980

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

## 02 196732

### INSTRUMENTED WHEEL TESTING

To enable the continuous measurement of vertical and lateral forces applied to rail by locomotives and cars, development of hardware and software for instrumented railway car wheels to enable the continuous measurement and analysis of vertical and lateral forces applied to rail by locomotives and cars under dynamic conditions is to improve productivity and safety of operation of railway rolling stock.

PERFORMING AGENCY: Canadian National Railways, I11C13811

INVESTIGATOR: Rennie, R

SPONSORING AGENCY: Canadian National Railways

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

## 02 308322

### TRANSIT TRUCK TESTING

The purpose of this project is to gather experimental dynamics data for a rail transit vehicle and to compare it with theoretical predictions from various analytical models. The aim is to validate MTC lateral stability and curving models.

#### REFERENCES:

- Investigation of Stability and Curving of a Rail Transit Vehicle, Volume 2: Instrumentation and Testing, Hsu, D; Skelton, S, 79-LAB-3, July 1979
- Investigation of Stability and Curving of a Rail Transit Vehicle, Volume 4: Nonlinear Curving Model, AppaRao, TA, TS-79-101, Feb. 1979

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication

INVESTIGATOR: Young, JA Tel (416) 248-3771 AppaRao, TA

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication

STATUS: Inactive NOTICE DATE: Feb. 1981 START DATE: May 1977 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Canada

## 02 308326

### WHEEL/RAIL PROFILE MEASUREMENTS

A survey of the wheel tread and rail head profile characteristics for the Toronto subway system has been carried out. Precision measurement equipment (wheel and rail profilometers) were designed and constructed for this purpose. Profile measurements have been made for 20 wheelsets and for 20 track locations (tangent track only). Computer analysis using this profile data will be carried out to establish typical in-service values for subway vehicle effective conicities and gravitational stiffness on tangent track.

#### REFERENCES:

Wheel/Rail Profile Investigation-Interim Report No. 1 Jackson, JD, Feb. 1977

Wheel/Rail Profile Investigation-Interim Report No. 2 Jackson, JD, July 1978

Wheel and Rail Profile Measurements for Urban Rail Transit Systems, Jackson, JD, Presented at ASME Winter Annual Meeting, Dec. 1978

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Transit Systems Research and Development Office, 3117

INVESTIGATOR: AppaRao, TA Tel (416) 248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Transit Systems Research and Development Office

RESPONSIBLE INDIVIDUAL: AppaRao, TA Tel (416) 248-3771

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1976 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: \$27,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Canada

## 02 308329

### SUPPORT FOR THE PERTURBED TRACK TEST OF LOCOMOTIVES

To reduce data and perform analysis of data taken during the perturbed track test of November and December 1978 at Pueblo, Colorado. Reports will be generated giving the pertinent findings of the test series, covering over 200 runs of instrumented 6-axle locomotives over the perturbed track. Such data as L/V ratio, maximum lateral and vertical forces, and ride quality will be presented.

PERFORMING AGENCY: ENSCO, Incorporated

INVESTIGATOR: Kesler, K Tel (703) 321-9000

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: O'Sullivan, WB Tel (202) 426-4377

Contract DOT-FR-64113 (CPAF)

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Aug. 1979 COMPLETION DATE: Aug. 1980

ACKNOWLEDGMENT: FRA

## 02 308330

### RESEARCH LOCOMOTIVE AND TRAIN HANDLING EVALUATOR

The objective of this project is to design, fabricate, and install a Research Locomotive and Train Handling Evaluator.

PERFORMING AGENCY: Teledyne Ryan Aeronautical

INVESTIGATOR: Juberg, E

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

Contract DOT-FR-9142

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1979 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: FRA

## 02 309937

### DYNAMIC INTERACTION BETWEEN RAILWAY BRIDGES AND MOVING VEHICLES

Using the displacement approach a mathematical model has been developed to evaluate the dynamic interactions between railway bridges and moving vehicles. The bridge model consists of a lumped mass system, with vertical degrees-of-freedom, whereas the vehicle is represented by three degrees-of-freedom: bounce, roll and pitch. The resulting, equations of motion

for the vehicle/bridge system, including the interactive forces, are developed and numerically solved to generate the dynamic impact factors for selected bridge member forces and nodal deflections. A parametric study is also performed to evaluate the influence on the impact factors of the number of vehicles on the span, span lengths, vehicle speeds, vehicle mass and suspension characteristics, and its initial roll and pitch motions. The impact factors obtained from the simulations are compared with the American Railway Engineering Association (AREA) recommendation, based upon field test data.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Singh, SP Tel (312) 567-3593

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1979 COMPLETION DATE: June 1981

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 02 309943

##### EFFECTS OF FLAT WHEELS AND TRACK IRREGULARITIES ON RAILWAY BRIDGE IMPACTS

The dynamic behavior of a railway truss bridge, during the passage of a train, is investigated, using lumped-mass model for the bridge, and a rigid-body model with three degree of freedom (bounce, pitch and roll) for the vehicles. The investigation is an extension of previous work to study the influence of Flat Wheels and other track-related irregularities upon bridge impact factors.

PERFORMING AGENCY: Illinois Institute of Technology

INVESTIGATOR: Chu, KH Tel (312) 567-3542

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Mar. 1980 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 02 309944

##### NONLINEAR ANALYTICAL AND DESIGN TOOLS FOR RAIL VEHICLES

Wheel/rail interactions play an important role in studying the dynamic behavior of railway vehicles. These wheel/rail interaction phenomena are highly nonlinear and when combined with the other nonlinearities inherent in the various vehicle suspension systems, the mathematical modelling of dynamic vehicle response becomes quite complex. In recent years, many models have been developed, in which nonlinearities have been neglected, and linear approximations have been used. Although, linear theory often yields qualitatively-correct results, it fails to predict the sensitivity of the model to the inherent nonlinearities, such as wheel profiles, creep forces, suspension clearances, coulumb damping, etc. A statistical linearization is being used to account for these nonlinearities, and studying of the hunting, curving and rock-and-roll behavior of railway vehicles are feasible. The effects of track irregularities are also included in the formulation of the model.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Hedrick, JK Tel (617) 253-6257 Wormley, DN

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1978 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 02 319080

##### LADING ANALYSIS FRATE MODEL (RAILCAR LADING RESPONSE)

The objective of the project is to obtain information required to effect a reduction of railcar lading damage in boxcars. This will be done through determining the dynamic characteristics of boxcars and developing lading damage statistics. The FRATE model is to be modified for a 70-ton boxcar

with complaint lading and modify the model for an empty boxcar including center plate separation in roll. A validation plan is to be prepared for validation of the revised FRATE model. The model will be used to develop track geometry descriptors based upon vehicle performance.

PERFORMING AGENCY: Mitre Corporation

INVESTIGATOR: Kachadourian, G Tel (703) 827-6903

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Orth, CL Tel (202) 755-1877

Contract DOT-FR-54090

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Feb. 1980 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$299,626

ACKNOWLEDGMENT: FRA

#### 02 319082

##### TRAIN PERFORMANCE CALCULATOR/TRAIN OPERATIONS SIMULATOR EVALUATION

The purpose of this project is to conduct a survey and assessment of all available TPC/TOS in order to eliminate any unnecessary development of TPC/TOS due to lack of awareness of existing capability. This project will (1) evaluate the adequacy, usability, and usefulness of existing TPC/TOS models; (2) contribute to industry awareness of TPC/TOS analytical tools, (3) indicate to FRA whether further development of these models is warranted. Two reports will be completed including a handbook of TOS/TPC methodology. The Handbook will be available late 1980.

REFERENCES:

Train Performance Calculator: A Survey and Assessment Gill, LC; Wong, PJ, SRI International, FRA/ORD-81/02 133p, Dec. 1980

Train Performance Calculator: Recommendations for Research and Development, Howard, SM; Gill, LC; Wong, PJ, SRI International, FRA/ORD-81/03 83p, Dec. 1980

PERFORMING AGENCY: SRI International, SRI Project 8497

INVESTIGATOR: Wong, PJ Tel (415) 326-6200 Gill, L Howard, S

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract DOT-FR-9082

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Mar. 1980 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: \$29,143

ACKNOWLEDGMENT: FRA

#### 02 323378

##### TRACK TRAIN DYNAMICS

This project involves the following tasks: 1) to develop a mathematical rail failure model based on mechanical and metallurgical characteristics of rails when subjected to high axle loads; 2) to investigate wear and fatigue characteristics of wheels in order to recommend design improvements to promote safety and reduce costs associated with maintenance and replacement of railcar wheels; 3) to investigate the potential for producing an experimental rail curve grease formulated to inhibit crack nucleation and resultant fatigue cracking; 4) to measure comparative wear patterns and study the fracture characteristics of wheel profiles as applied to 100-ton capacity cars in unit train service; 5) to obtain quantitative data on comparative performance of conventional trucks, self-steering trucks and forced steering trucks; 6) to support the design and fabrication of a rolling laboratory test apparatus the interaction between wheelset and rails in curves or on tangent track and to provide the test data acquisition system; and 7) to investigate the dynamic effects caused by vehicle track interaction on track structure component life expectancy and maintenance as related to high speed traffic.

PERFORMING AGENCY: Canadian Pacific Limited

SPONSORING AGENCY: Canadian Pacific Limited

RESPONSIBLE INDIVIDUAL: Bethune, AE

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1973

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 02 323381

##### TTC SUBWAY RAIL LOAD TESTING

The purpose of the project is to measure vertical and lateral loads in the rails of the TTC subway due to passage of various types of car.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, O030GE

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication



Can  
RESPONSIBLE INDIVIDUAL: Billing, JR  
STATUS: Active NOTICE DATE: Dec. 1980 COMPLETION DATE: 1981  
ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 323383

## COMPARATIVE ANALYSIS OF RAIL VEHICLE TRUCKS

This project examines the effects of parametric and configuration changes on the stability and curving performance of rail vehicles. Conventional rigid frame trucks, self-steering trucks with inter axle connections, and forced steering trucks with body to axle linkages are included in this study.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 0029GE

SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

RESPONSIBLE INDIVIDUAL: AppaRao, TA

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Oct. 1979 COMPLETION DATE: Apr. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 324944

## QUANTITATIVE EVALUATION OF GEOMETRIC TRACK PARAMETERS DETERMINING VEHICLE BEHAVIOUR

The ORE C 152 Specialists Committee was set up in October 1979 to deal with this question. The main objectives of this question is to define the methods of measuring track geometry and the methods for processing these measurements, which would be most suitable for predicting certain reactions of vehicles, with a good correlation between the actual track geometry and the vehicle behaviour. At present the co-ordinated measurements of track geometry and vehicle response are being prepared and corresponding methods for their evaluation are being developed.

Question C152.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Korpanec, I Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: Oct. 1979

ACKNOWLEDGMENT: UIC

02 324947

## PROBLEMS CAUSED BY TRAIN TRAFFIC AT VERY HIGH SPEEDS IN TUNNELS

Railway modernisation and the steady increase in the maximum permissible speed on lines in operation or under construction (approaching 200 km/h, or above) makes it essential to have detailed and thorough knowledge about the aerodynamic effects occurring in tunnels as a result of such higher speeds. It has been found that the aerodynamic processes of trains in tunnels affect not only passenger comfort and the safety of staff working in tunnels but also the stresses to which the rolling stock is exposed. The object is thus to provide the railway Administrations with a tool for studying these problems, while at the same time minimizing the duplication of work by the various administrations.

Question C149.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981

ACKNOWLEDGMENT: UIC

02 325715

## MEASUREMENT OF RAIL LOADS ON THE TTC SUBWAY

Wear patterns have developed on certain portions of the TTC subway which correspond to the hunting characteristic of some classes of subway cars. Two pieces of track, one new and the other worn, were instrumented with strain gauge arrays to measure vertical and lateral rail loads under all classes of cars. Statistical analysis of L/V ratios then provides insights into the causes of wear and assists in determination of remedies for cars and/or track.

REFERENCES:

Measurement of Rail Heads on a Subway System Presented at Int'l Conf on Wheel/Rail Load & Displ Meas Tech, Billing, JR

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 31145

INVESTIGATOR: Billing, JR Tel (416) 248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can; Toronto Transit Commission

RESPONSIBLE INDIVIDUAL: Hendry, IG Tel (416) 534-9511

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Apr. 1980 COMPLETION DATE: Apr. 1981

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can

02 325943

## FIELD ELECTRO-OPTICAL INSPECTION OF PORTAL CRANE TRACKAGE

Develop electro-optical concepts to remotely detect and measure anomalies and other weaknesses which can lead to railcar and crane derailment. Site inspection of portal crane tracks will be conducted to establish mechanics of derailment. Concepts for detecting and measuring railway deterioration and weaknesses will be developed which exploit load-displacement (stiffness) characteristic of the trackage. It is envisioned that the concepts will have the capability to continuously and remotely monitor the one or more of the displacement freedoms of the railway-lateral and vertical translation or rotational. The concepts will rely on state-of-the-art electro-optic technology in unique applications.

PERFORMING AGENCY: Naval Construction Battalion Center, Department of the Navy

INVESTIGATOR: Warren, GE Jahnsen, FR

SPONSORING AGENCY: Naval Construction Battalion Center, Department of the Navy, DN087322

STATUS: Active NOTICE DATE: June 1981 START DATE: June 1980 COMPLETION DATE: Nov. 1982

02 329549

## SCALE MODEL DERAILMENT STUDIES

The objective of this research is to provide validation of analytical models of wheel/rail interaction and of performance indices that can be used to predict wheelclimb derailments. (A) scaled model of a single wheelset is used to establish the fundamental mechanics of the wheelclimb process. (A) detailed treatment is given to quasisteady wheelclimb in which lateral velocity is negligible and the yaw angle remains essentially constant and to single degree-of-freedom wheelclimb in which velocity effects are important but yaw. Angle remains essentially constant.

PERFORMING AGENCY: Princeton University

INVESTIGATOR: Sweet, LM Tel (609) 452-5305

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Lee, HS Tel (617) 494-2266

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1978 COMPLETION DATE: Dec. 1981

02 329552

## RAILWEAR ECONOMIC ANALYSIS

As part of the TDC/FRA Joint Research Project Agreement in Freight Car Technology the objectives of this project are as follows: To achieve maximum practical cooperation and exchange of data on freight car truck technology. To evaluate the rail renewal cost savings in typical U.S. and Canadian railway environments by adopting Type II trucks. Comparison is to be made using Truck Design Optimization Project (TDOP) dynamic performance measurements on Type II and conventional trucks as data input into the CIGGT Road Maintenance Cost Model computer program.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-930

INVESTIGATOR: McIlveen, ER Tel (613) 547-5777 Birk, AM Lake, RW

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Dibble, DW Tel (514) 283-4189

CONTRACT 09SD.T82009-9526DSS

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1980 COMPLETION DATE: June 1981 TOTAL FUNDS: \$37,262

ACKNOWLEDGMENT: CIGGT

02 329557

**APPLICATION OF ACTIVE AND PASSIVE SUSPENSION TECHNIQUES TO IMPROVE HIGH-SPEED GROUND VEHICLE PERFORMANCE**

The purpose of the proposed research is to develop and evaluate active and nonlinear passive suspension solutions to high-speed passenger vehicle problems and to assess their practicality. Such recent advances in control hardware as the availability of inexpensive and reliable microprocessors, and such advances in control theory as improved estimation and identification offer important potential solutions to ground vehicle ride quality, stability, and curving problems.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Hedrick, JK Tel (617) 253-6257 Wormley, D  
 SPONSORING AGENCY: Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1980

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 329569

**LABORATORY INVESTIGATION OF THE WEAR OF RAILS AND WHEELS**

To improve understanding of the effect lubrication, mechanical and operational variables or material properties may have on various forms of rail/wheel wear. A 1/8 scale wheelset/pair of rail discs wear test apparatus including accessories and microprocessor control and data logging equipment has been built. It will be used as a basic scientific instrument to study creepage-traction force relationship, wheelset steady state curving, curving resistance, etc., and as a practical rail material, wheel material or lubricant tester.

**REFERENCES:**

The Use of Angle-of-Attack Measurements to Estimate Rail Wear Under Steady State Rolling Conditions, Ghonem, H; Kalousek, J, Proc Int Conf on Wheel/Rail Load & Displacement Meas Techn

Development of 1/8 Scale Dual Disc on Disc Rail — Wheel Wear Testing Facility—, Kalousek, J, Canadian Metallurgical Quarterly

PERFORMING AGENCY: National Research Council of Canada, DME-78-L-16

INVESTIGATOR: Kalousek, J Tel (604) 542-4704

SPONSORING AGENCY: Government of Canada

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: 1977

ACKNOWLEDGMENT: National Research Council of Canada

02 329572

**ANALYTICAL AND EXPERIMENTAL FACILITIES FOR RAIL VEHICLE RESEARCH**

To investigate both experimentally and analytically the dynamic response of rail vehicles and loading to real and simulated on-track operating conditions, and to develop improved systems. Facilities: include impact ramp, car compression frame, instrument cars, full scale curved track dynamic simulator, dynamic vehicle tester, mathematical models. Activities: include fundamental and applied research and development under contract or cooperatively with rail equipment manufacturers, users and railway companies.

**REFERENCES:**

Facilities at NRCC for the Railway Vehicle Designer Smith, CAM; Bowler, EH, DME/NRC Transportation Newsletter, Vol 12. No. 1, Aug. 1980

PERFORMING AGENCY: National Research Council of Canada, DME-78-L-29 DME-78-L-32 DME-78-L-37

INVESTIGATOR: Smith, CAM Tel (613) 998-9638

SPONSORING AGENCY: Government of Canada

STATUS: Active NOTICE DATE: Feb. 1981

02 329576

**FUNDAMENTAL STUDIES OF PHENOMENA RELATED TO WHEEL-RAIL CONTACT STRESSES**

The objective is to provide fundamental information on an important group of engineering problems relating to stresses at the wheel-rail interface. It is proposed to relate the forces and deformations at the contact surface between the wheel and rail. This research lies at the core of unsolved problems on wear, fracture and plastic flow of wheels and rails. It will also aid in understanding the dynamic behavior of rail vehicles, including

problems of hunting and stability, ride quality, derailment, reliability and adhesion. Interrelated elastic contact stress problems at the contact surface between the wheel and rail are classified as Hertzian if they satisfy certain basic conditions. Work under this program has led to a means of solving the non-Hertzian contact problems for virtually all arbitrary geometries by use of a computer program profiles in non-Hertzian contact. The usefulness of program CONFORM and other computer programs will be improved by incorporating a better characterization of the creepage forces and including additional degrees of freedom for penetration of a wheel into a railhead as well as kinematic coupling effects of wheelset as influenced by various track parameters.

PERFORMING AGENCY: Pennsylvania University, Philadelphia

INVESTIGATOR: Paul, B Tel (215) 243-7191

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Woll, TP Tel (202) 426-9564

Contract DOT-OS-60144

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1981 COMPLETION DATE: Jan. 1984

ACKNOWLEDGMENT: FRA

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: Teel, S Tel (202) 426-0090

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: June 1971 COMPLETION DATE: July 1981

ACKNOWLEDGMENT: UMTA (IT-06-0026)

03 046502

## RAILWAY 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. The use of theory already developed is being used to improve the geometric design of wheels.

### REFERENCES:

Thermal Damage and Rail Load Stresses in a 33-Inch Railroad Car Wheel, Wetenkamp, HR: Kipp, RM, ASME Paper 77WA/RT-2, Jan. 1978

The Influence of Brake Shoes on the Temperature of Wheel in Railroad Service, Wetenkamp, HR; Eck, BJ; Rhine, PE, ASME Journal of Engineering for Industry, Vol. 102 No. 1, Feb. 1980

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics

INVESTIGATOR: Wetenkamp, HR Tel (217) 333-2313

SPONSORING AGENCY: Griffin Wheel Company

RESPONSIBLE INDIVIDUAL: Wetenkamp, HR Tel (217) 333-2313

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1976

ACKNOWLEDGMENT: Science Information Exchange (JGF 29)

03 050338

## STEERING TYPE RAIL CAR TRUCK DEVELOPMENT

Develop rail car trucks with superior tracking characteristics and ride quality. Freight Car Trucks-DR-1 Steering Assembly for retrofitting conventional 70 and 100-Ton three-piece freight car trucks--to add steering and high speed stability. Multiple units now being manufactured by Dofasco in Canada, and Dresser in the U.S. AAR Certification has been received for these units. DR-2 to be developed in 1979 and 1980, by some manufacturers. These units will be much like a conventional three-piece freight car truck, but with the addition of steering, positive aligned braking, improved ride quality, and high speed stability. Passenger-Transit Car Trucks being developed by the Budd Company.

### 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  
Performance Analysis & Testing of a Conventional Three-Piece Freight Car Truck Retrofitted to Provide Axle Steering, Marcotte, P; Caldwell, WN; List, HA, Winter Annual Meeting ASME, Dec. 1978

PERFORMING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited; Budd Company

SPONSORING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited; Budd Company

RESPONSIBLE INDIVIDUAL: List, HA Cope, GW Bexton, HJ Herring, JM

In-House

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Jan. 1971 COMPLETION DATE: 1982

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated, Dresser Transportation Equipment Division, Dominion Foundries and Steel, Limited

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. Earlier road service environmental tests to measure loads/stresses to which components are subjected under all types of operating conditions were further broadened into higher speed ranges in late 1977 to 1978. IITRI reduction and analysis of recorded data has been translated to methods of laboratory bolster dynamic tests. Initial lab tests of 1975 through 1978 were conducted at the testing laboratories of American Steel Foundries and Dresser Transportation Equipment Division. An additional fatigue testing program was started in December 1978, and continued through May 1980 at the AAR Technical Center. This lengthy laboratory test schedule broadened the experience base and validated the guidelines proposed for an interim bolster fatigue test specification. Initial review of the proposed guidelines has led to simplified test procedures. Their acceptance into AAR specification requirements is expected in 1981. The project's program is complete. A final report will be published in early 1981.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Evans, RA

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Britton, JG Tel (312) 567-3578

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: 1973  
TOTAL FUNDS: \$250,000

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: Feb. 1980

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 have been completed and two reports have been published. The tests included 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. Through accident data analysis, a review of the vulnerability of appurtenances is continuing and a report has been recently published.

**REFERENCES:**

Phase 09 Final Report on Bottom Fittings Protection Test Program, Kunz, EL; Olson, LL, AAR Technical Center, AAR R-343, Dec. 1978

Addendum to Phase 09 Final Report on Bottom Fittings Protection Test Program, Kunz, EL; Olson, LL, AAR Technical Center, AAR R-364, Apr. 1979

Study of Bottom Discontinuity Damage on Non-pressure Stub Sill Tank Cars in Derailments during 1977 and 1978, Kunz, EL; Phillips, EA; Role, H, AAR Technical Center, AAR R-409, Feb. 1980

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: Feb. 1981

ACKNOWLEDGMENT: AAR

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. NAV-SURFWPNCEN/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: Richardson, J

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Mould, J Tel (202) 426-1227

STATUS: Active NOTICE DATE: Feb. 1981

ACKNOWLEDGMENT: FRA

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.

Final report is being prepared.

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0005

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: Feb. 1981 START DATE: July 1971 COMPLETION DATE: Mar. 1981 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: Teel, S Tel (202) 426-0090

Contract DOT-UT-10007

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Dec. 1976 COMPLETION DATE: July 1981 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. 1980 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: Feb. 1981 START DATE: July 1976

ACKNOWLEDGMENT: FRA

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/AS



Improved Passenger Equipment Evaluation Program Technology Review. Second Semiannual Report, De Villiers, AL, Unified Industries, Inc; Federal Railroad Administration, FRA/ORD-78/38, May 1978, PB-283659/AS

PERFORMING AGENCY: Unified Industries, Incorporated/SBA  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Lampros, AF Tel (202) 426-9564

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Sept. 1977 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: \$2,677,428

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 improvements. Contractors will perform a series of tasks including one requiring the development of a minimum number of car performance and dimensional specifications which collectively describe 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

An Investigation of Rail Rapid Transit Carbody Materials Morris, R et al, Available at NTIS, UMTA-IT-06-0175-80-1 140 p., PB80-170970

Proposed Analysis Methodology for Rail Car Propulsion System Selection, Bamberg, W; Eldredge, D, Available at NTIS, UMTA-IT-06-0229-80-1 50p, 1980, PB80-201460

Roster of North American Rapid Transit Cars 1945-1980 American Public Transit Association, Available at NTIS, UMTA-DC-06-0121-80-1 299p, 1980, PB80-213564

PERFORMING AGENCY: Decision Group, Incorporated, IT-06-0175; Lea (ND) and Associates, IT-06-0229; American Public Transit Association, DC-06-0121

INVESTIGATOR: Morris, RE Tel (703) 827-0227 Elms, CD Tel (703) 471-4007 Cihak, FJ Tel (202) 828-2888

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090

#### CONTRACT DOT-UT-70043

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1976 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$1,600,000

ACKNOWLEDGMENT: UMTA

## 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: Completed NOTICE DATE: Feb. 1981 START DATE: May 1976 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$212,000

ACKNOWLEDGMENT: American Public Transit Association

## 03 170604

### URBAN RAPID RAIL VEHICLES AND SYSTEMS PROGRAM PHASE IV

The Urban Rapid Rail Vehicle and Systems (URRVS) Program includes several projects identified as STARS (Subsystem Technology Applications to Rail Systems). These projects will provide products, for near-term deployment, products and services that meet identified, consensus needs of transit operators. These projects encompass both carborne and wayside needs. Initial items are: AC Propulsion, Improved/Modular Air Conditioning, Static AC Auxiliary Power, Improved Doors, Recommended Practices for Electromagnetic Compatibility, Enhanced Reliability of Fare Collection Equipment and Reduced Escalator Maintenance.

PERFORMING AGENCY: American Public Transit Association  
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60060

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: May 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$389,309

ACKNOWLEDGMENT: American Public Transit Association

## 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, Res & Special Program Admin

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

#### Contract DOT-OS-70052

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: July 1977 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$235,800

ACKNOWLEDGMENT: DOT

## 03 170639

### CONDITIONS WHICH SHOULD BE COMPLIED WITH BY WAGON COMPONENTS FOR 22 T AXLE LOAD

According to the Programme of Work, the B 142 Committee has completed its investigations as follows: 1) Comparative strength tests of Y 25 C bogies with welded frame and with cast frame, with 20 t and 22 t axleload (see B 142/RP 1); 2) Braking tests (see B 142/RP 2); 3) Fatigue and durability tests on the VELIM test circuit (see B 142/RP 3); 4) Comparative tests with the reinforced Y 25 C type bogies (see B 142/RP 4). The results of the tests described in Reports B 142/RP 1 and B 142/RP 3 show that the Y 25 bogie with cast frame with integral cross member capable of taking 22 t axleloads is now available. Equipped with the modified damping system, new springs and elastic side friction blocks, a Y 25 bogie can be constructed with cast frame suitable for use with the 22 t axleload, from the point of view of strength and wear of components. The results obtained by the B 142 Committee may be used as a basis for defining a Y 25 bogie with welded frame, suitable for 22 t. Similarly, the DB 665 bogie and the two-axled wagons can be improved. Some solutions can already be envisaged. The B 142 Committee has carried out all the studies entered on its Programme of Work.

Question B142. Four reports have been published to date.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

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 absorbing systems, other means); preparation of leaflets for side buffers, elastic systems and long-stroke shock absorbing systems. Acceptance testing of spring systems. Theoretical calculation of longitudinal forces in trains; theoretical calculation of the behaviour in buffing impacts of goods wagons. In compliance with a request of the UIC the Committee is focusing its studies on laying down the technical conditions to be fulfilled by side buffers and by drawgear. As the competent body on the part of the UIC for the acceptance of elastic systems for the automatic coupler, the Committee is at present supervising the relevant acceptance tests on elastic systems of the types Sagem 12054 and RIV-SKF. The studies concerning the adaptation



of the leaflet to "Elastic systems for goods wagons" (automatic coupler) are being continued. In order to simplify the measurements and evaluation during dynamic buffing tests, comparative tests have been carried out. The work of setting up a mathematical model for simulating the behaviour in buffing impacts of wagons under various operating conditions, taking into account the interaction of wagon, load, load protection system and shock absorbing equipment has been begun. Studies concerning the generation of longitudinal forces in trains of various lengths, masses and compositions with side buffers and screw couplers have also been carried out by means of a computer program.

Twenty two reports have been published to date. Question B36.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Buchner, J von Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

ACKNOWLEDGMENT: UIC

### 03 170643

#### TESTS ON AUTOMATIC COUPLING

The engineering work on the automatic coupler for wagons (type AK UIC 69e) was completed. Current work mainly concerning the acceptance tests on variants of the coupler body and on interchangeable parts of the automatic coupler, are about to be completed. The revised complete set of drawings for the production of the automatic coupler is available. A rather large number of these couplers is 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 5 400 tonnes are also being equipped for ore traffic; they were placed in operation early in November 1976. Four more of these unit trains of this order are now in revenue earning services. The remaining studies to be started shortly within the scope of the question "Mass and composition of goods trains" terminate the stage proper of "Tests on goods wagons". Studies covering the design of the automatic coupler for passenger coaches have been completed. Some details of this coupler vary from that for wagons. Direct coupling with the automatic coupler for wagons is ensured. The first couplers were delivered early in 1979. The required studies on these couplers are now in progress. At present extensive riding stability tests (maximum speed = 200 km/h) are being made by the FS. The B 51 Specialists Committee is also taking part in a large number of other studies, e.g. devices on the headstocks of wagons, installation drawings and questions of automatic as far as connected with the automatic coupler.

Twenty-one reports have been published to date. Question B51.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Buchner, J von Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

ACKNOWLEDGMENT: UIC

### 03 170646

#### STANDARDISATION OF PASSENGER CARS

The Programme of Work of the B 106 Committee at present deals with the question "Permissible stresses in components in and on passenger coaches". It involves ascertaining the load assumptions and assessment criteria, adopted by the various railways for components of passenger coaches and for their fastening systems, investigating the grounds on which they were based and establishing uniform principles for load assumptions. The work of the Committee was restricted in the first phase to studying the components inside coaches. This phase was completed with the approval of Report B 106/RP 2 in April 1980. At present the Committee is acting upon the request made by the Control Committee in April 1980, i.e. to direct its studies to components fixed to the outside of coaches.

Two reports have been published to date. Question B 106.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Schenk, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1970

ACKNOWLEDGMENT: UIC

### 03 170647

#### UNIFICATION OF ELECTRICAL EQUIPMENT FOR PASSENGER COACHES

When the B 107 and B 108 Committees were amalgamated, the B 108 Committee was made responsible for dealing with problems concerning the optimisation of air circulation and heat distribution in passenger coach compartments. A first report on the subject (B 108/RP 4) was published in 1979. A further synthesis report will summarise all the results obtained by the Committee in this field. The B 108 Committee completed its standardisation remit by publishing a specification for electrical equipment for coaches (restricted to control equipment) (B 108/RP 5). Studies on the other items of the Programme of Work are in progress, such as relays, safety fuses, lighting, batteries.

Four reports have been published to date. Question B108.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1973

ACKNOWLEDGMENT: UIC

### 03 170658

#### NON-POLLUTING SANITARY INSTALLATIONS

The Programme of Work involves determining the capacity requirements to be met by non-polluting toilet systems, which have already been installed or which it is intended to install in passenger coaches, studies in service conditions, studies of discharge problems, and a study of medical/hygiene problems. Closed toilet systems of different types are currently in use or under trial on the SNCF, DB, SJ, VR and BR. The Committee is making a comparative assessment of these tests. A first draft of technical conditions for closed toilet systems has been prepared. The standardisation of connecting parts for use for discharge purposes in international traffic is being investigated. A programme is at present being prepared for comparing the various toilet systems from the point of view of practical bacteriological risks.

Two reports have been published to date. Question B140.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Buchner, J von Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

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 Sammon, JP Tel (202) 293-4027

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. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

### 03 172456

#### STANDARDISATION OF WAGONS

Standardization of wagons (vehicles, containers, sub-assemblies and parts) and standardization of components, as well as development of acceptance

test conditions and design of assemblies of components and improvement on standardized vehicles are studied. Currently, work on vehicles has chiefly been concentrated on the bogie wagons of UIC Leaflet series 571 and includes sets of standard drawings for nine types of freight cars. Work on two more types is being carried out now, and work on the 13th and 14th should be started. Work on containers and sub-assemblies is also being carried out. Test conditions and programs are continuously being developed.

Thirty reports and several technical documents have been published to date. Question B12.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Schenk, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

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. 1980 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: Guilfooy, RF, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043920)

## 03 185234

### TRANSIT RELIABILITY INFORMATION PROGRAM (TRIP)

The Scope in Phase I is to operate an experimental data bank with rapid rail vehicle and bus data from a few selected operating properties. The Phase II effort is to monitor all rapid rail vehicles 10 years old or younger in the U. S. plus about 5000 buses. The Phase III scope is to expand TRIP to become a National Transit Reliability Data Bank.

PERFORMING AGENCY: Transportation Systems Center, PPA/UM029

INVESTIGATOR: Robichaud, RH Tel (617) 494-2302 Watson, L  
SPONSORING AGENCY: Urban Mass Transportation Administration  
RESPONSIBLE INDIVIDUAL: Limpert, SB Tel (617) 658-6100

Contract DOT-TSC-1559

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1978 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$562,080

ACKNOWLEDGMENT: Dynamics Research Corporation

## 03 188657

### RADIAL-AXLE PASSENGER CAR TRUCKS

Test & evaluation of a self-guided radial passenger truck capable of operation at speeds of 125 mph. Based on the Scheffel cross-anchor design, the non-powered version will be installed under an Amcoach for performance and life (endurance) testing at the U.S. DOT Transportation Test Center.

PERFORMING AGENCY: General Steel Industries, Incorporated; Buckeye Steel Castings

INVESTIGATOR: Jackson, KL Tel (314) 423-6500

SPONSORING AGENCY: Federal Railroad Administration, Office of Passenger Systems Research and Development; National Railroad Passenger Corporation

RESPONSIBLE INDIVIDUAL: Schorr, RL Tel (202)426-9665

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: 1976 COMPLETION DATE: 1981 TOTAL FUNDS: \$1,000,000

## 03 188663

### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III, TASK 5--ADVANCED FREIGHT CAR RESEARCH

Performance specifications will be developed in this task for freight car designs that will have improved dynamic performance and structural integrity having particular benefits in the area of reduced track and road bed damage. The task will draw upon the advanced design methods, materials research, vehicle testing, engineering economics, and advanced concept evaluation studies within the Track Train Dynamics program. It will also use the results of the track and rolling stock experiments in the FAST and FEEST projects and other freight car subsystem research projects such as the Truck Design Optimization Program and other D.O.T. programs.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Manos, WP Tel (312) 567-3585

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. 1979 START DATE: Jan. 1979 COMPLETION DATE: 1981

## 03 195918

### IMPROVING REFRIGERATION SYSTEMS IN VAN CONTAINERS FOR TRANSPORT OF PERISHABLES

Develop, evaluate, and demonstrate specific improvements in refrigerated van containers and trailers used to transport perishables and the application of new technology and equipment for environmental control and air distribution to commercial practice in an economical and efficient manner. The USDA van container which is equipped with an unloading compressor, continuous blower operation, and under-the-floor air distribution system will be instrumented to monitor humidity and temperature of air and product automatically in transit. Experimental shipments of a variety of fruits and vegetables will be conducted from various parts of the United States to foreign and domestic markets in all seasons and climates including a shipment of mixed vegetables to the Caribbean. The effectiveness of the interfacing of the air delivery system with different types of packaging, unitizing methods, and loading patterns will be evaluated in paired shipments with conventionally refrigerated containers.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory

INVESTIGATOR: Kindya, WG Breakiron, PL

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Aug. 1978 COMPLETION DATE: Aug. 1981



ACKNOWLEDGMENT: Current Research Information Service (CRIS 0044695)

### 03 308323

#### MTC EXPERIMENTAL STREETCAR WHEELS (PHASE 2, FIELD TESTING)

A new type streetcar wheel developed by the Ontario MTC is to be field tested on a Toronto Transit Commission streetcar. The tests will determine the overall acceptance of the wheel for in-revenue service. The wheel has been particularly developed for noise and vibration control. Phase 1 (Project 31124), which included design, manufacture, and lab testing (static and vibration), is now complete field testing is scheduled to begin February 1981.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can, 31128; Toronto Transit Commission, Equipment Department

INVESTIGATOR: Strasberg, L Tel (416) 248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can; Toronto Transit Commission, Equipment Department

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1979 COMPLETION DATE: July 1981 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Can

### 03 308324

#### RING DAMPED RAILWAY WHEELS

The first phase of this project will determine the efficacy of using damping rings on subway wheels in an attempt to control squeal noise. The lab tests done to date have determined the natural frequencies and some of the mode shapes of the wheel. The damping ratios with and without various rings under varying conditions have been obtained. Phase 2 involved field testing of the damping rings on a Toronto Transit Commission subway vehicle. These tests were performed in January 1981 and evaluation of the results obtained is currently in progress.

#### REFERENCES:

Vibration Properties of Two Ring Damped TTC Railway Wheels Strasberg, L; Tiessinga, J, Ontario Ministry of Transportation and Communications, Oct. 1978

Point Impedances of Railway Wheels Strasberg, L; Tiessinga, J, NOI-SEXPO 80 Paper, Apr. 1980

The Effects of Varying Ring Parameters on the Modal Damping Ratios of Ring Damped Railway Wheels, Strasberg, L; Tiessinga, J, INTERNOISE 80, Dec. 1980

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can, 31129

INVESTIGATOR: Strasberg, L Tel (416) 248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Aug. 1978 TOTAL FUNDS: \$75,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Can

### 03 308325

#### MTC EXPERIMENTAL STREETCAR WHEELS (PHASE 1 DESIGN, MANUFACTURE, LAB TESTING)

A new type streetcar wheel has been developed by the Ontario MTC. The wheel is particularly adapted to aid in the control of noise and vibration problems. Phase 1, now complete, involved the design, manufacture, and laboratory testing of 10 prototype wheels. Phase 2 (Project 31128) will allow field testing of the wheels on a Toronto Transit Commission streetcar.

#### REFERENCES:

Properties of Railway Wheels Strasberg, L; Perfect, N; Elliott, GL, Acoustics and Noise Control in Canada, Apr. 1978

Some Static and Dynamic Properties of Railway Wheels Strasberg, L; Perfect, N; Elliott, GL, ASME Paper 78-WA/RT-4, Dec. 1978

Point Impedances of Railway Wheels Strasberg, L; Tiessinga, J, NOI-SEXPO 80 Paper, Apr. 1980

The Design of the MTC MG 105 Experimental Streetcar Wheel Strasberg, L, Policy Planning & Res, Ontario Ministry of Transp & Commun, Rpt. TVSTR-81-104, Jan. 1981

Static Testing of the MTC MG 105 Experimental Streetcar Wheel, Strasberg, L; Pena, L, Policy Planning & Res, Ontario Ministry of Transp & Commun, Rpt. TVSRD-80-116, Aug. 1980

Vibration Testing of the MTC MG 105 Experimental Streetcar Wheel, Strasberg, L; Tiessinga, J, Policy Planning & Res, Ontario Ministry of Transp & Commun

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, Can; 31124

INVESTIGATOR: Strasberg, L Tel (416) 248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Feb. 1977 TOTAL FUNDS: \$233,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Can

### 03 308331

#### WAYSIDE DETECTION RESEARCH FACILITY

The "Wayside Detection Research Facility" (WDRF) has been established to develop and demonstrate viable automated means for monitoring of rail car components and performance as a moving train passes in-track and trackside sensor systems. The WDRF is located at the Transportation Test Center at Pueblo, Colorado, and is being used to study the effectiveness of various types of off-the-shelf and new sensor systems in a stand-alone mode and in various system combinations. The data from this facility will be useful in developing specifications for an operational Wayside Detection Facility, and provide information to help increase the effectiveness of sensors presently installed on operating railroads.

#### REFERENCES:

Wayside Derailment Requirements Study for Railroad Vehicle Equipment, Fararey, JL, Shaker Research Corporation, FRA/ORD-77/18, May 1977

Feasibility of Rolling Stock Performance Via an Integrated Modular Wayside Approach, Ferguson, JD, FRA, Technical Proc 4th Annual Railroad Engineering Conf, pp 165-173, Mar. 1978

PERFORMING AGENCY: Aerospace Corporation

INVESTIGATOR: Feigenbaum, E Tel (202) 488-6052 Young, J

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Ferguson, JD Tel (202) 426-1682

Contract DOT-AR-74355

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1977 COMPLETION DATE: Sept. 1983 TOTAL FUNDS: \$5,000,000

ACKNOWLEDGMENT: FRA

### 03 309939

#### ELASTO-PLASTIC STRESS ANALYSIS OF A RAILROAD WHEEL

Railway Wheel Failures, due to thermal cracking, is a common problem. This research work involves an investigation of the thermal stress in wheel plate area due to prolonged heating of the wheel, under drag braking conditions. The study concerns an Elasto-Plastic Stress Analysis of wheels, under repeated thermal loading inputs, to calculate the resulting residual stresses in the plate area. The effects of mechanical loads are also included. The resulting stress histories are then used to calculate the fatigue lives of the wheels.

PERFORMING AGENCY: Association of American Railroads Technical Center, Dynamics Research Division

INVESTIGATOR: Thomas, TJ

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

In-House

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: Sept. 1979 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Association of American Railroads Technical Center

### 03 309941

#### A METHODOLOGY FOR THE HYBRID FORMULATION OF FINITE ELEMENTS, AND ITS APPLICATION TO ELASTO-PLASTIC ANALYSIS OF THREE-DIMENSIONAL SOLIDS

In recent years, Hybrid formulations of finite-elements have been extensively used in the field of structural analysis. In this investigation, a methodology is developed to formulate an equilibrated stress field for such element. The stress field is derived from a strain field, which is compatible with the assumed displacement field. The Hybrid elements result in a better displacement and stress approximation for the given finite element mesh, as compared to assumed-displacement models. The Hybrid elements will be



used in the elasto-plastic analysis of a railroad car wheel, subjected to both cyclic mechanical and thermal loads. The investigation will concentrate on the analysis of the wheel rim areas.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Singh, SP Tel (312) 567-3594

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

In-House

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1979 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Association of American Railroads Technical Center

03 309942

## FATIGUE LIFE EVALUATION OF A CRITICAL FREIGHT CAR COMPONENT FOR A GIVEN INPUT LOAD SPECTRUM

The railroad industry needs an analytical capability for evaluating the fatigue lives of critical freight car components. In order to overcome this problem, a project is currently underway to combine the finite-element program, SPAR, with the fatigue life analysis program, FLAP. The resulting package will then be used to perform elastic stress analysis of freight car structures and their associated components for the given input loading conditions. The input loading conditions are in the form of statistical representations of the average acceleration spectra. The program then calculates the equivalent stress-time histories for the particular structural component under study. The stress history, along with the appropriate modified Goodman diagram is then used to calculate the corresponding fatigue life of the component.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Prasad, B Tel (312) 567-3620

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

In-House

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1979 COMPLETION DATE: Aug. 1980

ACKNOWLEDGMENT: Association of American Railroads Technical Center

03 319081

## SINGLE AXLE TRUCK/ARTICULATED SUSPENDED CAR CHARACTERIZATION

Conduct field testing of the Budd BUDX 2000 articulated car and the single-axle autoguard car to determine their performance characteristics in the railroad environment. Will measure wheel/rail forces and motions with instrumented wheelset and other instrumentation.

PERFORMING AGENCY: ENSCO, Incorporated

INVESTIGATOR: Kenworthy, MA Tel (703) 960-8500

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Tsai, N Tel (202) 426-0855

### CONTRACT

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1980 TOTAL FUNDS: \$290,000

ACKNOWLEDGMENT: FRA

03 323382

## MODIFICATION TO TTC TRUCKS TO IMPROVE THEIR DYNAMIC BEHAVIOUR

This project includes the following: a) examination of the nature and extent of the poor dynamic behaviour of some trucks presently in use; b) cost-benefit analysis of modifying the trucks to improve their performance; c) computer analysis of trucks to determine the most promising modifications; d) design of truck modifications; and e) testing of the vehicles with and without modifications to determine the amount of improvement.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication, O038GG

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication, Can

RESPONSIBLE INDIVIDUAL: AppaRao, TA

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Mar. 1980 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

03 329555

## FREIGHT CAR DESIGN AND SERVICEABILITY IMPACTS ON FREIGHT CAR UTILIZATION

The Program will complete the report of Task Force 6, Phase II on the out-of-service time caused by light bad orders on a major class 1 railroad. It will disseminate the report and publicize its conclusions, especially to railroad mechanical officers, government agencies which set design standards for railroad cars, and the car building industry.

### REFERENCES:

The Impact of Freight Car Design and Serviceability on Freight Car Utilization, AAR Task Force II-6 and Input-Output Computer Systems, AAR R-438 160p, Feb. 1981

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Muehlke, RV

SPONSORING AGENCY: Association of American Railroads, American Railroads Building, 1920 L Street, NW

RESPONSIBLE INDIVIDUAL: French, PW Tel (202) 293-4165 Muehlke, RV

Contract 035-78

STATUS: Active NOTICE DATE: Feb. 1981

ACKNOWLEDGMENT: AAR

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. 1979

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 have been 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. Experimental work on this question has been temporarily interrupted pending classification of matters concerning future research into the possible international application of the expected results.

Four reports have been published to date. Question A103.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Korpanec, I Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1967

ACKNOWLEDGMENT: UIC

04 193777

**SUBSYSTEM TECHNOLOGY APPLICATIONS TO RAIL SYSTEMS (STARS)**

The objectives of the STARS Program are to apply existing technology to the solution of rail transit operators' pressing technical and operational problems and deploy these solutions in the near term. Furthermore, the subsystem technology applications are to be self-paying such that the development and deployment costs are offset by the benefits to the properties in terms of performance reliability, safety, and service. STARS is a "quick response" program which emphasizes technology which are compatible with existing rail systems, such that deployment can be commenced within the next 5 years in order to improve transit and reduce costs. The projects selected: Car equipment, including technology application investigation; controls/communications/power, including technology application investigations; and maintenance technology application investigations. Three car equipment development programs have been defined: Alternating-current induction motor propulsion system; static-inverter auxiliary power supply; and improved air comfort system. In controls/power, electrical power distribution modeling and validation for rail transit systems has been initiated. Electromagnetic interference of chopper controlled propulsion systems with the existing train control track signaling systems is being investigated. A technology investigation has been partially completed for Fare Collection systems. An investigation and assessment of the use and maintenance of escalators has been completed, with a report in preparation. In response to the recent severe winters in the Northeast with consequential disruption of rail transit service, an assessment is currently underway appraising the available technologies for combating winter weather.

Contract to a performing agency not yet awarded.

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Oren, R Tel (202) 426-0090

STATUS: Programmed NOTICE DATE: Aug. 1980 START DATE: Sept. 1979 COMPLETION DATE: Sept. 1984 TOTAL FUNDS: \$19,375,000

ACKNOWLEDGMENT: UMTA

04 196717

**PROPULSION**

Important advances have been made with respect to AC traction motor control as a spin off of the linear synchronous motor work on the maglev project. A development program is being defined and the first stage of this program will involve hardware development. This will be done on a cooperative basis with the Department of Industry, Trade and Commerce and private Canadian industry. The theoretical analysis work on the design of AC traction motors and motor control systems will be continued with the University of Toronto in parallel with the hardware development. Some exploratory work will be started into new applications of linear motors (particularly the LSM) for transport applications.

PERFORMING AGENCY: Transport Canada Research and Development Centre, FA34A55114

INVESTIGATOR: Rudback, NE

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

04 196721

**PROPULSION AND CONTROL SYSTEM FOR THE BOMBARDIER-LRC LOCOMOTIVE**

First two equipments have been installed and tested on LRC units to be leased by Bombardier to AMTRAK. Project has been expanded to supply the new excitation control and wheel slip system on freight locomotives. Delivery of first will be 72-2400 HP units to Mexico.

PERFORMING AGENCY: Canadian General Electric Company Limited, I11H21865

INVESTIGATOR: Woodbury, DE Tel (705) 742-7711

SPONSORING AGENCY: Canadian General Electric Company Limited

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Jan. 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

04 196748

**DUAL-MODE LOCOMOTIVE (DML) SYSTEM ENGINEERING STUDY**

The dual-mode locomotive (DML) concept is based upon the idea that a diesel-electric locomotive could operate more efficiently over its duty cycle if it were capable of utilizing wayside electric power when it is available. The Wayside Energy Storage Study, FRA/OR&D-78/78.I-IV, found that such a vehicle is necessary for the successful recovery of braking energy. The study also indicated potential benefits from such a vehicle merely from the electrification of grades and from use on currently electrified or partially electrified routes. The purpose of the Phase I systems engineering study is to further define and quantify the potential benefits of the DML. As part of this study, the contractor will establish a base-line concept with a preliminary design and performance specification. The contractor will also perform an in-depth technical and economic analysis. Subsequent phases of this project, should FRA and DOE decide to continue, would include the selection of an existing locomotive to retrofit, and the detailed design, fabrication and testing phases. The second phase of the program is due to begin in April, 1981.

**REFERENCES:**

Dual-Mode Locomotive Systems Engineering. Volume I Summary, Lawson, LJ; Cook, LM, Garrett Corporation, FRA/ORD-80/82.I 93p, Nov. 1980

Dual-Mode Locomotive Systems Engineering. Volume II Detailed Description and Analysis, Lawson, LJ; Cook, LM, Garrett Corporation, FRA/ORD-80/82.II 196 pp, Nov. 1980

PERFORMING AGENCY: AiResearch Manufacturing Company, 06.40.00.000

SPONSORING AGENCY: Federal Railroad Administration, Office of Research & Development, Freight Service Division

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract DOT-FR-53-80-C-00010

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Dec. 1979 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: \$115,000

ACKNOWLEDGMENT: FRA

04 323374

## PROPULSION TECHNOLOGY

The application of AC traction motors, flywheel hybrid drive systems, homopolar LSM motors and other advanced propulsion concepts to improve the energy efficiency and competitiveness of Canadian transport. Support research, development and demonstration of new types of propulsion for transportation. This project has concentrated on the rail and road transportation modes, but is not limited to these modes.

Prepared in cooperation with SPAR Aerospace.

PERFORMING AGENCY: Transport Canada Research and Development Centre, 061GH; Toronto University, Canada

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Audette, M

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Jan. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

04 325456

## STIRLING ENGINE

DOE awarded a contract to Mechanical Technology Incorporated (MTI) in March 1978 to develop Stirling engines. The MTI team includes United Stirling of Sweden and AM General, a subsidiary of the American Motors Corporation. The goal of the Automotive Stirling engine program is to advance the technologies as demonstrated in a series of engine prototypes so that the potential for high fuel efficiency, low noise and air pollution, and low costs can be proven. The program then will: transfer technology to the United States; encourage active private sector interest and involvement; stimulate earliest possible commercialization of Stirling engine-powered highway vehicles; provide positive transportation energy conservation without sacrificing personal mobility; and provide true transportation fleet multifuel capability as nonpetroleum fuels become available. Program activities are currently concentrated on design and fabrication of a new, more advanced automotive Stirling engine and development of improved components and materials. Detailed design of this new Stirling engine, called ASE MOD I, will be completed in June. This engine is scheduled to be tested on an engine dynamometer in February 1981. The component and materials development is directed at an improved engine called SE MOD II. This engine is intended to meet or exceed the final program objectives and will be tested in a vehicle by EPA in 1984.

PERFORMING AGENCY: Mechanical Technology Incorporated

INVESTIGATOR: Nightingale, N

SPONSORING AGENCY: Department of Energy, Office of Conservation and Solar Energy, NASA DEN3-32

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1978 COMPLETION DATE: Sept. 1984

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (FJ 2901)

04 329556

## FEASIBILITY STUDY OF ADAPTIVE CONTROL OF THROTTLE AND BRAKING FORCES FOR LONG FREIGHT TRAINS

Self-tuning regulators are being investigated to develop decentralized control of multi locomotive powered trains. An off-line open loop control schedule of the throttling and braking inputs is chosen to maintain a given velocity and acceleration pattern. The self-tuning regulators require little apriori information about the parameters of the train. The proposed decentralized on-line adaptive control scheme is simple and powerful. It can minimize the effect of noise due to grade changes. The control algorithm is illustrated by simulation examples.

### REFERENCES:

Train Braking Performance Studies Using Suboptimal Controllers-Part I, Gruber, P; Bayoumi, MM, Canadian Institute of Guided Ground Transport, CIGGT Rpt 79-11, 1979

Train Braking Performance Studies Using Suboptimal Controllers-Part II, Gruber, P; Bayoumi, MM, Canadian Institute of Guided Ground Transport, CIGGT Rpt 79-12, 1979

State Estimation in Long Freight Trains Gruber, P; Bayoumi, MM, Canadian Institute of Guided Ground Transport, CIGGT Rpt 79-21, 1979

Reduced Order Model Observer for State Estimation in Long Freight Trains, Gruber, P; Bayoumi, MM, 2nd IFAC Workshop on Control-App of Nonlinear Programming, 1980

Throttle and Brake Control of Multi-Locomotive Powered Long Freight Trains, Wong, KY; Bayoumi, MM; Gruber, P, Third Int'l Symposium on Large Engineering Systems, 1980

Partially Decentralized Control of Multi-powered Trains Gruber, P; Bayoumi, MM, Third Int'l Symposium on Large Engineering Systems, 1980  
Suboptimal Control Strategies of Multi-Locomotive Powered Trains, Gruber, P; Bayoumi, MM, IEEE Conf on Decision & Control Dec. 10-12, Albuquerque, NM, 1980

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-003

INVESTIGATOR: Bayoumi, MM Tel (613) 547-2878 Wong, KY

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: English, GW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1980 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$9,710

ACKNOWLEDGMENT: CIGGT

04 329570

## LOCOMOTIVE TRACTION MOTOR BEARING FAILURE STUDY

To ascertain the cause of sporadic failures of traction motor bearings (particularly during winter operation). The study has involved two investigations. One utilising a traction motor set up in an environmental chamber in the Ottawa laboratory (T.R. Ringer, J.F. Lane) to ascertain how water enters the bearing reservoirs and another at the Vancouver laboratory (C. Dayson) to assess the effectiveness of the wick lubrication system.

PERFORMING AGENCY: National Research Council of Canada, DME-78-G-25

INVESTIGATOR: Dayson, C Tel (604) 542-4477 Ringer, TR Tel (613) 993-2439 Lane, JF

SPONSORING AGENCY: Government of Canada

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: 1977

ACKNOWLEDGMENT: National Research Council of Canada

04 329571

## SNOW INGESTION BY LOCOMOTIVE TRACTION MOTORS

Snow ingestion by traction motors is a major cause of locomotive failure and costs the Canadian railway millions of dollars in maintenance each winter. Considerable savings in maintenance costs and inventory could be realized if this problem were substantially reduced. Initially, an understanding of the precise mechanism of ingestion is being sought so that effective solutions may be devised. In addition, tests on various types of locomotive air filters are being made to determine their effectiveness under snow conditions.

PERFORMING AGENCY: National Research Council of Canada, DME-79-L-41

INVESTIGATOR: Stallabross, JR Tel (613) 993-2371 Hearty, PF

SPONSORING AGENCY: Government of Canada

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: 1979

ACKNOWLEDGMENT: National Research Council of Canada

05 170652

**BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS**

The studies of this Committee mainly concern: 1) Comparative tests on test rigs to verify the conditions imposed on these rigs; 2) Tests under wet and wintry conditions; 3) Study of test methods to check the quality of the linings; 4) Study of the problem of the brake power limits of the disc brake. Report RP 4 describes the first part of the studies made on several full-size test rigs. The object of the studies in progress in this connection is to check all the conditions, requirements and recommendations concerning the test rigs and the implementation of tests within the scope of the acceptance programme for brake linings for disc brakes and brake blocks. With effect from 1.1.1980 these conditions have been incorporated in UIC Leaflet 541-3 and 541-4. The present state of knowledge concerning the functioning of disc brakes in a damp environment will be described in Report RP 6 (planned for the end of 1980). The studies under winter conditions (started in September 1977 after the termination of Question B 132) were delayed. The programme planned could not be carried out, because of difficulties with the test rig in the climatic chamber at the MBVA, Vienna Arsenal. The results of the studies concerning quality control methods were published in April 1979 in Report RP 5. The other studies, using small-scale test rigs, are in progress. In compliance with the request of the Control Committee, the problem of the brake power limits has been studied in co-operation with the Sub-Committee for braking and a schedule has been prepared for the studies required. These studies cannot be terminated within the originally planned time schedule for Question B 126; consequently the study period has been extended to 1982. The Specialists Committee has finally tried to adapt the title of Question B 126, so as to account for the extended activities and has decided to adopt the following title: "Railway braking with various friction materials".

Five 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: Dec. 1980 START DATE: 1973

ACKNOWLEDGMENT: UIC

05 170656

**STANDARDISATION OF THE MATERIAL FOR CAST-IRON BRAKE BLOCKS**

So far the following points of the Programme of Work have been dealt with: 1) Choice of grades of cast iron intended for the tests (preparation of technical and manufacturing specifications for brake blocks); 2) Laboratory tests concerning their chemical composition, mechanical strength and metallurgical structure; 3) Dynamic tests on small test rig; 4) Choice of grades of material for the tests on full-scale rigs; 5) Tests on full-scale rigs; 6) Track tests with individual wagons. On the basis of the first 4 points, 5 different materials were selected. The results were presented in Report B 146/RP 1 (October 1979). The full-scale brake rig tests (DB rig at Minden and SNCF rig at Vitry) made it possible to reduce the number of materials for track tests to three. The full results of the braking roller rig tests will be published in Report B 146/RP 2. The track test programme is in progress. The work has been divided, according to the braking system used (S, SS, P, R), among four railways, viz. CFF, MAV, PKP and SJ. It seems that it will be the resistance to wear and to cracking which will be the chief criteria in selecting the standard material.

One report has been published to date. Question B146.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

ACKNOWLEDGMENT: UIC



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:** Conover, HH  
**SPONSORING AGENCY:** General Railway Signal Company

**STATUS:** Active **NOTICE DATE:** Aug. 1979 **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. 1979 **START DATE:** Sept. 1975

**ACKNOWLEDGMENT:** AAR

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.

**PERFORMING AGENCY:** SRI International  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Cracker, WF, Jr Tel (202) 426-0855

**STATUS:** Active **NOTICE DATE:** Feb. 1981 **START DATE:** July 1978 **COMPLETION DATE:** Dec. 1980 **TOTAL FUNDS:** \$190,000

**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.

**PERFORMING AGENCY:** Shaker Research Corporation  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Cracker, WF, Jr Tel (202) 426-0855

**STATUS:** Active **NOTICE DATE:** Feb. 1981 **START DATE:** Sept. 1978 **COMPLETION DATE:** Jan. 1981 **TOTAL FUNDS:** \$210,000

**ACKNOWLEDGMENT:** FRA

06 160400

**ASSESSMENT AND EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY**

The objective of the FRA Signal/Control Program was to assess the state-of-the-art of newly available and presently installed Signal/Control Systems, develop a set of specifications for a state-of-the-art improved system, demonstrate the equipment, and certify requirements for cost-effective upgrading of Signal/Control Systems as used on intercity passenger rail routes. This new system would have speed capability, would be compatible with electrification, shall be capable of bidirectional operation, and shall reflect the most modern technology that is economically justified. It is recognized that in developing any improved system, economic restraints may require the retention and incorporation of a substantial amount of existing signal and control equipment.

**REFERENCES:**

Task 1: Assessment of Signal/Control Technology and Literature Review, Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.1 195 p., Dec. 1978, PB-296494/AS

Task 2: Status of Present Signal/Control Equipment Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.2 122 p., PB-299891/AS

Task 3: Standardization, Signal Types, Titles Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.3 356 p., PB80-142441

Task 4: Electrical Noise Disturbance Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.4, July 1980, PB81-111130

Task 5: Economic Studies Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.5, Jan. 1981

Task 6: Specification Development Taylor, SF; Marshall, JF; Schultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.6, Mar. 1981

**PERFORMING AGENCY:** STV, Incorporated  
**INVESTIGATOR:** Taylor, SF Tel (215) 326-4600  
**SPONSORING AGENCY:** Federal Railroad Administration, Office of Passenger Systems, RRD-22  
**RESPONSIBLE INDIVIDUAL:** Woll, TP Tel (202) 426-9564

**CONTRACT DOT-FR-773-4236 (CPFF)**

**STATUS:** Active **NOTICE DATE:** Feb. 1981 **START DATE:** Sept. 1977 **COMPLETION DATE:** Mar. 1981 **TOTAL FUNDS:** \$752,025

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 measurement and analysis of intensive measurements has led to a simple practical method for the prediction of signal strength for VHF and UHF propagation in the railway terrain (lines, stations and tunnels).

Five reports have 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: Dec. 1980

ACKNOWLEDGMENT: UIC

#### 06 196718

##### LIC SIGNALLING & COMPUTER AIDED DISPATCH FACILITY FOR HIGH SPEED

To provide enhanced schedule adherence and improved safety for the Montreal-Quebec high speed rail passenger service demonstration. A conventional automatic block signaling system and dispatch console will be used with the new passenger service. The addition of Location, Identification and Control (LIC) equipment plus a modern computerized dispatch facility to the planned installation would provide significant additional service reliability benefits at a relatively modest cost. The LIC signaling and computerized dispatch systems are now in an advanced state of development under TDC contracts and would be available for implementation and operational employment on this project.

PERFORMING AGENCY: Transport Canada Research and Development Centre, FA34A13120

INVESTIGATOR: Rudback, NE

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 06 196719

##### COMMUNICATION COMMAND AND CONTROL

The Division has placed emphasis on the application of modern electronic equipment and control techniques to improve the operating efficiency of conventional transport systems. Work underway includes study into methods of continuously transmitting train diagnostic signals to the locomotive cab, electro-pneumatic train brakes, computer aided dispatching, and a radio linked location, identification, and control (LIC) train signalling system. Signalling is now entering the stage of limited prototype systems trials. A project is planned for full scale demonstration of this promising new signalling technology, as such a demonstration is considered to be the only way of obtaining acceptance from the major Canadian railway. The export potential for LIC signalling, which is believed excellent, is unlikely to be realized before a full scale Canadian implementation.

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A54113

INVESTIGATOR: Rudback, NE

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 06 196730

##### POLE LINE RESEARCH

To evaluate techniques for detection of internal decay in railroad signal and communication poles, including strength. The research is undertaken since conventional species of wood poles are being depleted and present pole lines have not been adequately maintained by pole replacements. Surveys of certain mainline sections of pole line have commenced to determine the existing condition of the line and evaluate the amount of useful life in the poles to provide adequate reliability of operation. The surveys will continue on all mainline sections where railroad signal circuits are involved. This research will assist in determining the strength and reliability of existing pole lines for railroad signal operations.

PERFORMING AGENCY: Canadian Pacific Limited, I11H54853

INVESTIGATOR: Tufts, LD

SPONSORING AGENCY: Canadian Pacific Limited

STATUS: Active NOTICE DATE: July 1979 START DATE: May 1977 COMPLETION DATE: Dec. 1983

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 06 308308

##### INDUCTIVELY--COUPLED POWER TRANSMISSION-SYSTEMS FOR LONG TRAINS

Inductive couplers which were manufactured under previous contract will be mounted on a 32 car unit train for field testing. The reliability and durability of the couplers will be monitored over an 18 month period, while they are being used as a train line communications link.

##### REFERENCES:

A Communications System for Long Trains Aitken, GJM, CIGGT Rpt. 75-4, Feb. 1975

Inductive Coupling for Transmission of Braking Signals in Long Freight Trains, Aitken, GJM, CIGGT Rpt. 77-4, Jan. 1977

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-927.00

INVESTIGATOR: Aitken, GJM

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific Railways

RESPONSIBLE INDIVIDUAL: Tufts, LD Tel (613) 547-5777 Cass, B

Contract 376/927

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$53,099

ACKNOWLEDGMENT: CIGGT

#### 06 329578

##### LIGHTWEIGHT VEHICLE TRACK SHUNTING

The objective of this program is to investigate the quality of track circuit shunting of lightweight single-car rail passenger vehicles (specifically the LEV Railbus) to characterize the extent of the shunting problem and identify possible improvements. Interest in a low-cost railway passenger vehicle and the announced plans to operate such a vehicle in a demonstration program between Concord, NH, and Lowell, MA, made it advisable to review the quality of track circuit shunting. Recent experimental testing with the Leyland Experimental Vehicle (LEV-1) in January 1980, demonstrated shunting to be a significant problem by not consistently tripping either the track circuits for train signaling and control operations nor the circuits used to control highway grade-crossing warning signals and gates. Lightweight vehicles of this general type have often experienced this problem.

PERFORMING AGENCY: Dyer (Thomas K), Incorporated

INVESTIGATOR: Horvath, R Tel (202) 466-7755 Foley, P

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Woll, TP Tel (202) 426-9564

Contract DOT-FR-53-80-P-00141

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1980 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: FRA

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 design and fabrication of a locomotive and train handling evaluator, measurement of the noise environment of the train crews, 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

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Feb. 1981

ACKNOWLEDGMENT: FRA

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 Public Support for Railroad Training Stewart (DA) and Associates, Jan. 1978

Local Level Labor-Management Workshop (Buffalo Terminal Project), Conrail, Aug. 1979

Local Level Labor-Management Workshop (Houston Terminal Project), Oct. 1979

Project REAP: A Report to the Industry (Alcohol Conference), Jan. 1980

Local Level Labor-Management Workshop (Buffalo

SPONSORING AGENCY: Federal Railroad Administration, Office of Federal Assistance

RESPONSIBLE INDIVIDUAL: Kozak, DJ Tel (202) 426-6277

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Apr. 1975

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 Miller, CJ

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. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

07 196746

**LIGHT AND COMMUTER RAIL ACCESSIBILITY STUDY**

In the Surface Transportation Act of 1978 (Title III), Congress required two special accessibility studies: one to be performed by operators of rail rapid transit systems to obtain site specific cost figures of accessibility improve-

ments (Sec. 321 a), and the other to be conducted by the Department of Transportation (Sec. 321 b) to determine ways, desirability, and costs of making light and commuter rail systems fully accessible to elderly and handicapped. The contractor must perform four tasks: (1) categorical analysis of handicapped and development of demand data, (2) census of systems, vehicles/stations/stops and associated barriers, (3) development of evaluation criteria for potential accessibility solutions, and (4) development of accessibility options, estimated costs, and comparison of alternatives. The final report will be the basis for Departmental legislative recommendations to clarify or amend Federal laws pertaining to accessibility requirements affecting the light and commuter rail modes.

PERFORMING AGENCY: Crain and Associates, CA-06-0125

INVESTIGATOR: Crain, JL Tel (415) 327-8101

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment UTD-30

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090

Contract DOT-UT-90026

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$565,000

ACKNOWLEDGMENT: UMTA

07 196747

**FEASIBILITY STUDY OF ADAPTING LIFTS TO LIGHT RAIL AND COMMUTER RAIL VEHICLES**

The purpose of this study is to make a detailed census of light and commuter rail vehicles, assess current problems associated with existing bus lifts, provide a definition of the interface constraints associated with retrofitting lifts on these vehicles, and identify additional impediments to accessibility inside these vehicles for the wheelchair handicapped.

PERFORMING AGENCY: Technology Research and Analysis Corporation, MA-06-0025

INVESTIGATOR: McInerney, T Tel (703) 522-2440

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kangas, R Tel (617) 494-2298

Contract DOT-TSC-1711

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: May 1979 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: UMTA

07 324945

**APPLICATION OF THE ISO 2631 STANDARD TO RAILWAY VEHICLES**

The chief objective of the B 153 Committee is to develop a standard testing method within the UIC which is compatible with the ISO texts currently being revised and which will make it possible to assess the exposure to vibrations of passengers and staff in railway trains. The main objects of the preliminary studies are to catalogue the recordings made and the different analysis methods used, and to apply the Standard 2631 to a few typical practical cases. Parallel with this, the standard is being examined in detail and the various problems arising in connection with its application by the railways are clearly formulated. Line tests and laboratory tests will be carried out to serve as a basis for UIC/ORE proposals to ISO. Permanent liaison is being established between the ORE B 153 Committee and the ISO TC 108 (Sub-Committees 2 and 4). The ultimate objective of the Committee is to draft recommendations to be incorporated into the future Standard ISO 2731 in so far as it affects railway transport.

Question B153.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: 1979

ACKNOWLEDGMENT: UIC

08 049658

**RAIL SAFETY/GRADE CROSSINGS PROTECTION**

The program consists of three major tasks: (1) Development of new concepts for train detection with capabilities to provide constant warning time to motorists, (2) Development of new and more effective means of providing warning to the motorists, and (3) Development of guidelines to improve the conspicuity of locomotives and to reduce the possibility of death and injuries due to grade crossing accidents.

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: Feb. 1981

ACKNOWLEDGMENT: FRA

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: Sept. 1979 START DATE: 1977 TOTAL FUNDS: \$800,000

08 196720

**GRADE CROSSING R & D**

Consideration of increasing the future operating speeds of rail passenger trains, particularly in the Montreal-Quebec Corridor, has resulted in R & D projects related to the safety of grade crossing for higher train speeds. Projects already initiated deal with the study of crossing protection for train speeds up to 125 mph, risk of derailment in train/road vehicle collisions, means of reducing the severity of accidents through rail vehicle structural design, and the definition of functional requirements for crossing protection using obstacle detection devices.

PERFORMING AGENCY: Transport Canada Research and Development Centre, FA34A41105

INVESTIGATOR: McClaren, W

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

08 308313

**DEVELOPING GUIDELINES FOR ELIMINATING UNNECESSARY RAIL-HIGHWAY GRADE CROSSINGS ON LOW-VOLUME RURAL ROADS AND STREETS IN SMALL COMMUNITIES**

Library and field research to determine and document the pros and cons of considering the closing of a rail-highway grade crossing as an alternative when assessing crossing and community needs. It is the thesis of this project that the availability of a procedure for deriving, reviewing and assessing possible alternative routing options and all their safety, traffic and community impacts, actual and potential, would promote understanding and acceptance of crossing closure as an option. This can best be accomplished if uniformly approached in a systematic fashion.

PERFORMING AGENCY: Kansas State University, Department of Civil Engineering, EES 2709, 2713, 2714

INVESTIGATOR: Russell, ER Tel (913) 532-5862

SPONSORING AGENCY: Federal Railroad Administration; National Railroad Passenger Corporation; Atchison, Topeka and Santa Fe Railway

RESPONSIBLE INDIVIDUAL: George, B Tel (202) 426-2920 Bellino, JO Tel (202) 383-2543 Holman, L Tel (913) 862-9360

Contract DOT-FR-9026

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Oct. 1978 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$38,063

ACKNOWLEDGMENT: Kansas State University

08 308314

**REVIEW OF ALL STATE STATUTES CONCERNING VARIOUS RAILROAD LAWS**

Using a five-page questionnaire developed by Mr. Bellino, research is being conducted into state laws concerning railroads. These questions fall into four categories: I) Highway Traffic Laws, dealing with the duties of motorists at crossings; II) Railroad Traffic Laws, designed to determine how each state controls speed, and other safety regulations; III) Installation, Maintenance, and Funding Responsibilities, showing each state's specific requirements and methods of paying for motorist warning devices, crossing surfaces, and degrees of federal, state and local participation; IV) Liability of state and railroads in cases of highway-railroad crossing accidents. Determining which states have similar or unique laws concerning the railroads will furnish a solid background for future research.

PERFORMING AGENCY: Kansas State University, Department of Civil Engineering, 2733, 2734

INVESTIGATOR: Russell, ER Tel (913) 532-5862

SPONSORING AGENCY: Association of American Railroads; National Railroad Passenger Corporation

RESPONSIBLE INDIVIDUAL: Amos, CL Tel (202) 293-4206 Bellino, JO Tel (202) 383-2543

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: July 1979 TOTAL FUNDS: \$4,950

08 309947

**RAILROAD-HIGHWAY CROSSING ACCIDENT CAUSATION STUDY**

Study will involve an analysis of crossing accident data, interviews with individuals involved in accidents and a review of accident reports to determine crossing accident causes.

PERFORMING AGENCY: IOCS Incorporated

INVESTIGATOR: Knoblauch, K

SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division

RESPONSIBLE INDIVIDUAL: Coleman, J

Contract DOT-FH-119682

STATUS: Active NOTICE DATE: Mar. 1980 START DATE: Oct. 1979 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$121,000

ACKNOWLEDGMENT: Federal Highway Administration (273289354)



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: Feb. 1981 START DATE: Sept. 1973

ACKNOWLEDGMENT: FRA

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: Feb. 1980 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: Feb. 1980 START DATE: Oct. 1977

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: McGuire, CW

Contract DOT-OS-60149

STATUS: Active NOTICE DATE: Feb. 1980 TOTAL FUNDS: \$175,000

ACKNOWLEDGMENT: DOT

09 170659

**NON-DESTRUCTIVE EXAMINATION PROCEDURES**

The E 139 Committee presented its first two reports in April 1979, one on magnetoscopic and ultrasonic testing of axle-shafts, and the second on the terminology concerning these two methods of inspection. At present work is in progress on tests in the works both on solid wheels and wheel tyres and on rails. Studies relating to the latter are in the hands of a working party on "Rails" and are sufficiently well advanced for a report (RP 3) to be presented at the beginning of next year on ultrasonic acceptance testing of rails in the works. The results of the tests carried out with solid wheels and tyres, as well as all the recommendations based on these tests, will be published in Report RP 5. Furthermore, two members of the E 139 Committee have in the course of this year published a technical document on methods of detecting faults in rails by eddy currents; this document will shortly be distributed. Finally, the Committee has also compiled extensive documentation on general non-destructive testing of rails in situ. The Committee is now able to publish a report on ultrasonic testing of rails in situ. This report (RP 4) outlines current methods and gives the main guidelines for the next few years. To summarise, by the end of 1981 or the beginning of 1982, the E 139 Committee could publish the following reports: RP 3: Ultrasonic testing of rails at the works (report almost completed), RP 4: Ultrasonic testing of rails in situ, RP 5: Ultrasonic testing of solid wheels and tyres.

Two reports published to date. Question E139.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

ACKNOWLEDGMENT: UIC

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.

**REFERENCES:**

A New Proposal for the Performance Testing of Shipping Containers, Godshall, WD, Package Development and Systems, 9(5): 21-23, Sept. 1979

PERFORMING AGENCY: Forest Products Laboratory

INVESTIGATOR: Koning, JW, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Nov. 1972 COMPLETION DATE: June 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0040039)

09 196724

**PREMIUM RAIL**

Premium rails, comparable in quality to imported quenched and tempered rails, are being developed by alloying and/or controlled cooling procedures in cooperation with Canadian rail users and manufacturers.

PERFORMING AGENCY: PMRL/CANMET, 430831; Department of Energy, Mines and Resources, Canada

INVESTIGATOR: Fegredo, DM Tel (613) 593-7104

SPONSORING AGENCY: Department of Energy, Mines and Resources, Canada

RESPONSIBLE INDIVIDUAL: White, DWG Tel (613) 593-7074

In-House

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1975 TOTAL FUNDS: \$300,000

ACKNOWLEDGMENT: PMRL/CANMET

09 319913

**FIRE RESISTANT MATERIALS**

Nonmetallic materials research will be performed to provide polymeric compounds with improved service properties and fire safety for both domestic and military aircraft. Polymer types with potential cost benefit to the development of lightweight aircraft structures will be investigated. Synthesis, chemical modifications, and molecular characterization of high char yield polymers will be done to provide candidate systems from which selections can be made for resin matrix binders, film formers, adhesives, foams, transparencies and modified carbon fibers. Criteria for selection will include reduced flammability, smoke and toxic gas emissions, fire impact stability and controlled electrical properties. The polymer microstructure, solid state physics and chemistry, environmental performance, and combustion characteristics with the attending toxicological effects as well as thermomechanical properties will be determined on new and advanced state-of-the-art polymers and related to projected applications. The data derived from these studies will serve as a base for analytical studies to predict fire endurance, toxic threat levels, carbon fiber release, and mechanical and environmental performance. Candidate polymers and processes will be provided for evaluation as prototype, subsystem components for testing, with particular and immediate attention being given to resin matrices for carbon fiber composite structures. In addition, quantum chemistry calculations will be applied to large polymers and graphitic structures to determine such properties as photodissociative stability and conductivity.

PERFORMING AGENCY: Ames Research Center, National Aeronautics and Space Administration

SPONSORING AGENCY: National Aeronautics and Space Administration, Office of Aeronautics and Space Technology, 505-33-31

RESPONSIBLE INDIVIDUAL: Heimbuch, AH

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Oct. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZH 870004 2)

10 170655

**RAILWAY NOISE**

The object of the Committee is to study the causes of railway noise, to develop remedies and to fix limiting values for the radiation of noise by vehicles and for the extent to which people are exposed to noise. Proposals have been made for the abatement of raking noise and curve squealing, the propagation of noise in the vicinity of railway installations has been studied and a computation model for the prediction of noise propagation has been developed. The efficacy of noise insulating walls along railway lines as well as vehicle screens has been studied. An acoustic comparison between various types of bridges has been made. Furthermore, technical noise insulation measures, to improve the acoustic performance of less recent railway stock, have been suggested. Studies have been carried out with a view to reducing the noise developed by permanent way machines. Regarding the problem of rolling noise in the contact area between wheel and rail, the corrugationary wear on the running surfaces of the wheel is being studied. To measure the irregularities in the running surface of the wheel, a laser profilograph will be used jointly with a mechanical measurement device. Following a request of the UIC Bridge Sub-Committee on acoustic comparison between several types has been made. A relevant report is being prepared. A report concerning the relationship between the disturbing effect of the noise caused by railway traffic and the noise produced by other means of transport is being prepared.

Eleven reports have been published to date. Question C137.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Lamla, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Dec. 1980

ACKNOWLEDGMENT: UIC

10 179325

**LOCOMOTIVE IN-CAB NOISE RESEARCH**

Occupational noise exposure of railroad workers has been of concern to railroad managements, labor organizations, and the U.S. Department of Transportation. 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 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 provide a means of identifying individual component sources as well as specific locomotive operations which contribute to the noise levels in the locomotive cab.

**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

Assessment of Locomotive Crew In-Cab Occupational Noise Exposure, FRA/ORD-80/91

PERFORMING AGENCY: National Bureau of Standards, 7353432

INVESTIGATOR: Kilmer, RD Tel (301) 921-3783

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: McCown, RJ Tel (202) 426-1227

Contract IAG-AR-T4269

STATUS: Completed NOTICE DATE: 8102 START DATE: Sept. 1976 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: National Bureau of Standards

10 188647

**URBAN RAIL NOISE ABATEMENT PROGRAM**

Provide services of an Advisory Board comprised of cognizant transit professionals recruited from rail transit properties (those operating, under construction and in design). Advisory Board, from the transit operators point of view, will review with U.S. DOT-TSC and its contractor both the progress and findings on the following contracts: (1) SEPTA In-Service Test & Evaluation Project--Acoustical performance and cost-benefits of various types of resilient/damped wheels and techniques for wheel truing and rail grinding. (2) Elevated Structure Noise Control Project--Inventory of elevated rail rapid transit structures and assessment of noise reduction techniques. (3) Handbook of Urban Rail Noise & Vibration Control--Development of design, construction, operation and maintenance guidelines for control/minimization of noise and vibration associated with urban rail systems.

PERFORMING AGENCY: American Public Transit Association, 7232

INVESTIGATOR: Gordon, TS Tel (202) 331-1100

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Dinning, M Tel (617) 494-2142

Contract DOT-TSC-1123

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: May 1976 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$68,000

ACKNOWLEDGMENT: American Public Transit Association

10 188654

**HANDBOOK OF URBAN RAIL NOISE AND VIBRATION CONTROL**

The objective of this contract is to produce a Handbook for the Prediction and Control of Urban Rail Noise and Vibration. This Handbook is intended to serve as a major source of information for transportation engineers and acousticians as well as a convenient tool for transit property personnel in their daily requirements for measurement, assessment, and control of rail noise and vibration.

PERFORMING AGENCY: Wilson, Ihrig and Associates, Incorporated, MA-06-0025

INVESTIGATOR: Wilson, G Tel (415) 658-8386

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Plank, G Tel (617) 494-2394

Contract DOT-TSC-1613

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Sept. 1978 COMPLETION DATE: June 1980 TOTAL FUNDS: \$110,000

10 188655

**DEVELOPMENT OF A NOISE CONTROL DESIGN GUIDE FOR EXISTING ELEVATED RAIL TRANSIT STRUCTURES**

Primary objective will be development of rules for reducing noise on those types of urban rail elevated structures which have the greatest environmental noise impact in the U.S. Deliverables will include an "Inventory of U.S. Urban Rail Transit Elevated Structures," computer implementation of relevant elevated structure noise models, a "Noise Control Design Guide for Existing Elevated Rail Transit Structures," and an experimental design for in-service test and evaluation of selected treatments.

**REFERENCES:**

Noise Rating Criteria for Elevated Rapid Transit Structures Schulz, T, UMTA-MA-06-0099-79-3

Noise Impact Inventory of Elevated Structures in U.S. Urban Rail Transit Systems, Towers, D, Bolt, Beranek & Newman, Rpt. 4239, Jan. 1980

Prediction of Noise Reduction in Urban Rail Elevated Structures, Remington, P; Wittig, L; Bronsdon, R, Bolt, Beranek & Newman, Rpt. 4347, Mar. 1980

Wayside Noise of Elevated Rail Transit Structures: Analysis of Published Data and Supplementary Measurements, Ungar, E; Wittig, L, Bolt, Beranek & Newman, Rpt. 4402, May 1980

PERFORMING AGENCY: Bolt, Beranek and Newman, Incorporated, UM-06-0025

INVESTIGATOR: Ungar, EE Tel (617) 4942185

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hinckley, R Tel (617) 494-2394

Contract DOT-TSC-1531

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1978 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$352,000

10 188673

**ENHANCEMENTS TO THE SES COMPUTER PROGRAM AND ITS APPLICATIONS**

The objective is to improve the current version of the Subway Environment Simulation (SES) computer program, expand its applications based on current needs of the transit industry, and facilitate its utilization by the industry. Task work involves the review and analysis of the state-of-the-art in subway environmental control, particularly with regard to fire-emergency control techniques; major revisions in the SES program and its documentation; and transfer of software maintenance capabilities to TSC computer equipment.

**REFERENCES:**

Subway Environmental Design Handbook, Vol II: Subway Simulation (SES) Comput Prog Ver 3, Part I; User's Manual, Parsons, Brinckerhoff, Quade and Douglas, Inc, Nov. 1980

Software Maintenance of the SES Computer Program Parsons, Brinckerhoff

off, Quade and Douglas, Inc, Dec. 1980

PERFORMING AGENCY: Parsons, Brinckerhoff, Quade and Douglas, Inc  
INVESTIGATOR: Kennedy, WD Tel (212) 239-7945

SPONSORING AGENCY: Transportation Systems Center, DTS-741; Urban Mass Transportation Administration, UMTA/UTD-30

RESPONSIBLE INDIVIDUAL: Snyder, A Tel (617) 494-2480

CONTRACT DOT-TSC-1592

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Oct. 1978 COMPLETION DATE: Oct. 1980 TOTAL FUNDS: \$191,397

#### 10 196753

##### SUBWAY ENVIRONMENTAL SIMULATION PROGRAM

To validate specific portions of the Subway Environmental Simulation (SES) program and to provide current information for the Subway Environmental Design Handbook for its use in predicting temperature distribution patterns during peak operating periods, safety ventilation operations, equipment operation cost savings, effectiveness of dome reliefs and temperature stratification patterns in large stations typical of the WMATA system.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority, DC-06-0267

INVESTIGATOR: Garrett, V Tel (202) 637-1158

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DC-06-0267

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1979 COMPLETION DATE: May 1981 TOTAL FUNDS: \$451,000

ACKNOWLEDGMENT: UMTA

#### 10 303272

##### PHYSICAL AND CHEMICAL PHENOMENA RESPONSIBLE FOR ODOR FORMATION IN DIESEL ENGINES

Diesel engines are well known for their fuel economy but they do emit combustion products which have unpleasant odors. This research is aimed at determining the engine conditions which produce the odors and thereafter decreasing the amount of odor. The present award builds on a previous Grant AER 76-19752. The main objectives of this award are: 1) to refine the methodology of measuring the amounts of odoriferous materials in a combustion gas stream, 2) to test specific hypothesis of the formation and destruction of odoriferous materials, 3) and to define the effects of important factors controlling the dynamics of combustion on odor emission.

PERFORMING AGENCY: Drexel University, School of Engineering, Dept of Mechanical Eng & Mechanics

INVESTIGATOR: Cernansky, NP

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, DAR76-19752 A03

STATUS: Active NOTICE DATE: July 1980 START DATE: June 1976 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 285 3)

#### 10 324949

##### VIBRATIONS TRANSMITTED THROUGH THE GROUND

The research programme is split-up into three main groups of investigations: The first group deals with the study of the generation and propagation of vibrations. In each instance, the propagation of vibrations from the track to adjacent buildings should be investigated at 3 measuring locations (track in deep tunnel, track in tunnel near the surface, track in the open), taking into account the characteristics of the track, the vehicles and the tunnel and also the ground characteristics. A transfer function should be sought and a mathematical model developed; the second group deals with the study of the effects of vibrations. The effects of vibrations on adjacent buildings (damage to buildings) and on people living in these buildings (annoyance) should be studied, having extensive recourse to results already existing, to be adapted to railway conditions by means of verifying measurements; and the third group deals with the study of measures to reduce vibrations. In this connection, the remedial measures already known should be assembled first of all and classified according to a uniform measuring program for their effectiveness. It is intended to continue the development of the available remedial measures or, if necessary, to develop new ones, which should each time be optimised for theoretical and practical applications.

Question D151.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Lamla, H Office of Research and Experiments

STATUS: Active NOTICE DATE: Jan. 1981 START DATE: June 1979

ACKNOWLEDGMENT: UIC

#### 10 325451

##### EVALUATE CONTROL TECHNOLOGY FOR DIESEL POWERED EQUIPMENT IN UNDERGROUND MINES

A survey of several coal and noncoal mines will be made to obtain data on typical duty cycles for vehicles powered by diesel engines. The objective is to provide baseline numbers for calculation of integrated levels of significant contaminants at various mine locations. In addition, the data will be useful for assessing fuel and manpower requirements for productivity studies. The mining vehicles will include LHD's locomotives, personnel transports, supply tractors, and shuttle cars. Representative mining operations will include room and pillar, bench, and blast and cave mining. A survey of about 25 mines will be conducted in which time studies of the operating equipment will be made. The horsepower output of each vehicle will be estimated and, if possible, measured during each cycle. The calculated average power use will be correlated with emission levels for several contaminants.

PERFORMING AGENCY: Bureau of Mines

INVESTIGATOR: Freedman, R

SPONSORING AGENCY: National Institute for Occupational Safety & Hlth, O-9277407-VOC-E31 IAA 79-17

Contract

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1979 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (FE 80)

#### 10 325453

##### UPGRADING AND UPDATING WASH-1238

The purpose is to upgrade and update WASH-1238, Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants, 1972. The work shall include current shipment data, changes caused by no reprocessing, higher burnup and enrichments, special routing considerations, and intermediate storage requirements. The transport of material associated with decommissioning is also to be considered as well as problems associated with waste. Analysis of accident data is to include health effects and risk analysis as given in NUREG-0170. Final document is to provide the technical basis for an EIS on the subject.

PERFORMING AGENCY: Sandia Laboratories

INVESTIGATOR: Luna, RE Finley, NC

SPONSORING AGENCY: Nuclear Regulatory Commission

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Dec. 1978 COMPLETION DATE: July 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (FE 2020)

#### 10 325457

##### AUTOMATIC LOADING SHUTDOWN SPILL PREVENTION SYSTEM

OBJECTIVE: The objective of this project is to design and demonstrate in actual use a transfer line system that will shut off automatically in the event of a line break or significant leak. The primary application of this system is for the loading and unloading of liquid hazardous materials from truck tankers, tank cars, barges, etc. APPROACH: The system consists of a transfer line and a pneumatically operated shut-off valve, which is activated by abnormal differences between inlet and outlet flows. When a flow differential is sensed electronically, a solenoid valve is de-energized and the shut-off valve is closed. Loss of electric power and/or air pressure in the system also causes the valve to close. In all cases of valve closing, an alarm is activated. PROGRESS: The transfer line has been designed and evaluated under laboratory conditions using water as the fluid being transferred. Subsequently, the system has been installed in a chemical plant and used in the off loading of railroad tank cars containing "TAMOL-L," an aqueous solution of the sodium salt of naphthalene-sulfonic acid.

PERFORMING AGENCY: Science Applications, Incorporated

INVESTIGATOR: Simmons, JA

SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development, 68-03-2039 CC33 -11801

RESPONSIBLE INDIVIDUAL: Brugger, JE

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1974 COMPLETION DATE: June 1980



ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GMA  
6965)

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.

**REFERENCES:**

Noncontacting Suspension and Propulsion for Ground Transportation, Wormley, DN; Richardson, HH; Hedrick, JK; Limbert, DA, DOT/R-SPA/DPB-50/79-34, Sept. 1979, PB80-176274

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Wormley, DN Tel (617)253-2246 Hedrick, JK Richardson, HH

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Barrows, TM Tel (617) 494-2286

Contract DOT-OS-60135

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1976 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$226,000

ACKNOWLEDGMENT: DOT

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: Feb. 1980 START DATE: July 1976 COMPLETION DATE: 1981 TOTAL FUNDS: \$4,055,091

ACKNOWLEDGMENT: UMTA

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**

An evaluation of the economic feasibility of high-speed guided ground passenger systems over selected routings linking Toronto, Ottawa, Mirabel and Montreal is reported. Three candidate ground systems—a 450 km/hr magnetically levitated (Maglev) system, a 260 km/hr electrified high-speed railway (HSR), operating on a dedicated double track in a new right-of-way, and a 200 km/hr diesel-electric intermediate-speed railway (ISR) operating on a partial double track in a combination of new and existing rights-of-way—together with the air mode (conventional--CTOL--and short

take-off and landing-- STOL) are examined under different economic-activity and petroleum-availability assumptions. Schedules of full cost recovery ticket-cost equivalents are developed as the basis for evaluation. The results indicate that a high-speed ground system serving this corridor would enjoy a substantial (and growing) advantage over the air mode under the study assumptions.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-848

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Boon, CJ Schwier, C Fitzpatrick, C

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Audette, M Tel (514) 283-2880

Contract OST-77-00109

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Dec. 1977 COMPLETION DATE: July 1980 TOTAL FUNDS: \$21,450

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. 1981 START DATE: Feb. 1977 COMPLETION DATE: June 1981 TOTAL FUNDS: \$166,000

ACKNOWLEDGMENT: American Public Transit Association

11 193781

**STUDY OF REQUIREMENTS FOR ADVANCED INTERCITY TRANSPORTATION SYSTEMS**

This project investigates the requirements for advanced intercity transportation in selected corridors in light of needs for energy efficiency and improved productivity. Various new technologies including tracked levitated vehicles and hybrid systems are considered.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Richardson, HH Tel (617) 253-2246 Wormley, DN

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1979 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Massachusetts Institute of Technology

11 196716

**HIGH SPEED GUIDED GROUND TRANSPORT APPLICATIONS**

The results of various advances in high speed technology will be incorporated in preliminary application studies, in order to guide and focus further component and concept developments.

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A53124

INVESTIGATOR: Myers, B

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1978 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

11 196729

**TRACKED LEVITATED VEHICLES**

A continuing thrust area investigates the potential of advanced types of tracked levitated vehicle ground transportation systems having non-contact suspension, guidance and propulsion, for high speed intercity travel, airport access and urban applications. The research and application challenges have stimulated strong cooperation among various programs worldwide, particularly in magnetic levitation and linear synchronous motor research to which Canada has contributed significantly. A main goal of the Division's track

levitated vehicle work has been to investigate this technology as a possible long term future alternative for Canadian intercity passenger transport for distances up to 500 miles. At present a system concept has been defined which is uniquely suited to Canadian demographic and climatic conditions. It is planned to proceed with the construction and test of the critical high technology components essential to the present design concept.

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A54112

INVESTIGATOR: Rudback, NE

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

**11 196738**

**EVALUATION PROJECT FOR INTEGRATED MAGNETIC SUSPENSION AND PROPULSION USING A SLIM WITH AN IRON-ONLY REACTION RAIL**

An experimental program (with analysis at the Mitre Corp.) to evaluate the single-sided linear induction motor for an integrated suspension-propulsion system for guided ground transport is underway. Subsequent to experimentation with a squirrel-cage rail, a solid steel-only rail has been mounted on the rim of a 7.7m diameter 0-101 km/h test wheel. A 1.73m long 6-pole motor is mounted in a 6-component force balance and energized by a 200 kva PWM inverter. Tests are being conducted over a wide range of operating conditions and data (3 phase voltages, currents, powers, frequency, speed, gap, forces, moments & flux distribution) are sampled, processed and stored in S.I. units by a 64-channel minicomputer acquisition system.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-902

INVESTIGATOR: Eastham, AR Tel (613) 547-3114 Dawson, GE

SPONSORING AGENCY: Mitre Corporation

RESPONSIBLE INDIVIDUAL: Katz, RM Tel (703) 827-6685

Contract 376 902

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: June 1979 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$63,000

ACKNOWLEDGMENT: CIGGT

**11 329558**

**MAGNETIC SUSPENSIONS FOR URBAN AND INTER-CITY TRANSPORTATION**

Tractive electromagnets with automatic control as a means of levitating and controlling ground transportation vehicles in both low-speed (urban) and high-speed (intercity) applications are studied. Particular emphasis is placed on the effects of lateral and heave motion, as well as forward speed, lift, draft, and controllability.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Wormley, Dd Tel (617) 253-2246 Richardson, H

SPONSORING AGENCY: Wormley, D

STATUS: Active NOTICE DATE: Feb. 1981

ACKNOWLEDGMENT: Massachusetts Institute of Technology

12 059864

**EVALUATION OF SAFETY OF LOADING AND SECUREMENT HARDWARE FOR TRANSPORTING WHEELCHAIR PASSENGERS ON TRANSIT VEHICLES**

The objectives include: (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: Rae, JW

SPONSORING AGENCY: Urban Mass Transportation Administration, CA-06-0098-00-01

Contract CA-06-0098-00-01 (FFP)

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1977 COMPLETION DATE: Mar. 1981 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 11--Thermal Effects Studies; Phase 12--Vessel Failure Research; Phase 13--Head Shield Study; Phase 14--Stub Sill Buckling Study; Phase 15--Switchyard Impact Tests; and Phase 16--Tank Car Wear Experiments 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 17-105A Car Study.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Phillips, EA Tel (312) 567-3607

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1981 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. 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.

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: Feb. 1981

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: Feb. 1980 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 simply by comparing 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: Feb. 1981 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 was conducted on a cooperative basis with the FRA. Results are not yet available.

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: Feb. 1981 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 nine year period 1971-1979 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: Feb. 1981 START DATE: 1970  
 ACKNOWLEDGMENT: AAR

12 130946

**QUANTITATIVE DESCRIPTIONS OF TRANSPORTATION ACCIDENTS INVOLVING HAZARDOUS MATERIALS**

Objectives: 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, Nuclear Materials Transportation Technology Dept 4550  
 INVESTIGATOR: McClure, JD Hartman, WF Foley, JT  
 SPONSORING AGENCY: Department of Energy, Division of Waste Management and Transportation  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1975  
 ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GPW 51-1)

12 135594

**STUDY OF PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS**

The objective of this task is to extend the work reported in Severities of Transportation Accidents (SLA-74-0001), to describe the accident environment to which large shipping casks may be exposed and, in addition, to describe the marine transport accident environment. These basic environmental descriptions are required to determine the risk of shipping radioactive material and the preparation of environmental impact statements. The basic approach used in this type of study has been to search historical records for the details of railroad, highway, and marine transport accidents. From this data base, description or profile of various accident types can be formed. Monte Carlo methods are sometimes used to describe the multi-variable data base which describes these accidents. From this type of analysis, the probability of occurrence of selected environmental parameters can be determined.

PERFORMING AGENCY: Sandia Laboratories, Transportation Technology Center  
 INVESTIGATOR: Pope, RB  
 SPONSORING AGENCY: Department of Energy, Transportation Branch Div of Transportation & Fuel Storage  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: 1975 TOTAL FUNDS: \$80,000

12 135596

**TRANSPORTATION ACCIDENT ENVIRONMENTAL DATA BANK**

Under this program, a centralized source of environmental information is provided for use by organizations engaged in risk assessment, testing, and evaluation of standards for programs involving the transportation of energy materials. Information generated is analyzed, summarized, and disseminated to potential users. Emphasis is placed on obtaining the latest information, ensuring comprehensive coverage of transportation application and publicizing the existence of the information. Such information is provided on a cooperative basis to other government agencies, industries, and when appropriate, to foreign nations. Information collected under this program has been and is being used as the prime source for studies of normal and accident transportation environments, in truck, train, aircraft, and ship modes of transport. The index to this work is updated annually and information is added to the program as it becomes available.

**REFERENCES:**

Transportation Accident Environment Data Index Foley, JT; Davidson, CA, SAND 75-0248C, Apr. 1977

PERFORMING AGENCY: Sandia Laboratories, Applied Mechanics Division II, 5522, AL 0517A  
 INVESTIGATOR: Davidson, CA Tel (505) 264-2765  
 SPONSORING AGENCY: Department of Energy, Division of Environmental Control Technology

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1975 TOTAL FUNDS: \$100,000

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: Feb. 1981 START DATE: June 1976 COMPLETION DATE: May 1981

ACKNOWLEDGMENT: FRA

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, OP-939  
 INVESTIGATOR: Gay, WF Tel (617) 494-2192  
 SPONSORING AGENCY: Department of Transportation, Office of Environment and Safety, 400 7th Street, SW  
 RESPONSIBLE INDIVIDUAL: McDonald, G Tel (202) 426-4492  
 STATUS: Active NOTICE DATE: Aug. 1979 TOTAL FUNDS: \$50,000  
 ACKNOWLEDGMENT: DOT, Transportation Statistical Reference File, TSC (498)

#### 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 permitted the best acoustic signals for the warning of gangs working on the track to be defined. A detailed analysis of the problem of automatic warning of track maintenance gangs taking into consideration the requirements of the various disciplines involved (track maintenance, personnel safety, telecommunications and signalling safety) has led to a full specification of system requirements which is considered to be practical.

Ten 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: Dec. 1980 START DATE: 1970  
 ACKNOWLEDGMENT: UIC

#### 12 170780

##### SAFETY AND SYSTEM ASSURANCE

Continue development of safety plans for rail transit, and initiate safety plans for light rail and bus transit systems. Assist UMTA in safety training courses at the Transportation Safety Institute, and reviews of safety programs at pre-operational and operational transit systems.

PERFORMING AGENCY: American Public Transit Association  
 SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60061  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Dec. 1976 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$531,613

ACKNOWLEDGMENT: American Public Transit Association

#### 12 188661

##### RAIL SAFETY INFORMATION SYSTEM

This computer information system consists of accident/incident reports and exposure data; inspection data on track, locomotives, equipment, signals, operating practices and hazardous materials; and the National Railroad-Highway Crossing Inventory. The system is used for report generation, statistical analysis, and research.

PERFORMING AGENCY: Federal Railroad Administration, Office of Safety, Reports and Analysis Division  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Safety, Reports and Analysis Division  
 RESPONSIBLE INDIVIDUAL: Haden, RB Tel (202) 426-2762

STATUS: Active NOTICE DATE: Aug. 1980  
 ACKNOWLEDGMENT: FRA

#### 12 193283

##### LIQUID METAL FAST BREEDER REACTOR SPENT FUEL SHIPPING TECHNOLOGY

The program will develop technology and provide equipment and methods for safe shipment of short-cooled liquid metal fast breeder reactor spent fuel.

The shipping cask safety will be demonstrated by experimental tests of prototype hardware which will be exposed to normal environments as well as planned failure tests. The failure tests will insure cask integrity and ability to predict cask response to hazards and establish criteria for public safety.

PERFORMING AGENCY: Sandia Laboratories, Regional and Transportation Assist Division  
 INVESTIGATOR: Jefferson, RM Freeman, JM  
 SPONSORING AGENCY: Department of Energy, Reactor Research and Technology Division

STATUS: Active NOTICE DATE: Mar. 1979 START DATE: Mar. 1975 COMPLETION DATE: Oct. 1984

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GPU 189 3)

#### 12 196740

##### INFORMATION AND GUIDANCE ON RADIOACTIVE MATERIALS TRANSPORTATION AND ACCIDENTS

This Guidebook is to provide first responders to transportation incidents involving radioactive materials with practical information for dealing with the situation pending arrival or information from radiological experts. Examples of accidents, common packages, labels, placards, and shipping papers are illustrated. Space is provided for user notation of needed phone numbers and reporting information. A tabulation will allow a responder to determine if a civil defense type radiation survey instrument is useful for the identified radioisotope in the incident. Three thousand copies of interim edition were delivered May 1980 with revised 1980 Edition expected March 1981.

PERFORMING AGENCY: Oak Ridge Associated Universities, Medical and Health Sciences Division  
 INVESTIGATOR: Ricks, R Tel (615) 576-3130  
 SPONSORING AGENCY: Department of Transportation  
 RESPONSIBLE INDIVIDUAL: Carriker, AW Tel (202) 426-2311

Contract DOE-40-744-79  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: DOT

#### 12 308320

##### RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT, PHASE 17-105A CAR STUDY

The objective of this study is to assess the safety of 105A insulated pressure cars in relation to the DOT 112J and 112T cars which as a result of DOT hazardous materials regulation HM-144 are required to have thermal shields, head shields and top and bottom shelf couplers. For proper perspective the study also will relate 105A car safety to the unshielded car types 112A and 114A. The comparisons will be made on the basis of accident data analysis as well as fire tests and mechanical impact tests. In addition to carrying the same products as are carried in the 112 type cars (propane, anhydrous ammonia, etc.) the 105A cars also carry other hazardous products such as chlorine, hydrogen chloride, hydrocyanic acid and carbon dioxide. The 105A Car Study will include six tasks. Task A will develop population data on the fleet of 105A tank cars over the period 1965-1978 and also develop recent tank car shipment data. Under Task B accident data will be assembled over the period 1965-1978. The objective of Task C is to compare on the basis of accident data, the vulnerabilities of the 105A and 112A (114A) cars to head puncture and thermal ruptures. Task D will involve a document review relating to expressed opinions and stated conclusions regarding 105A car safety and its relationship to the safety of the 112A (114A) and 112J (112T) cars. Task E will involve fire tests on 4 ft. x 4 ft. standard insulated test plates such as are specified in the HM-144 thermal shield tests. The test program may also involve fire tests on full size empty tank cars. The tests will be conducted by the FRA through the Ballistics Research Laboratory at their new test facility at Socorro, New Mexico. Task F, mechanical impact tests, include puncture and gouge type drop tests on insulated plate samples. The 105A car Study will be conducted in close cooperation with the FRA with the physical testing Tasks E and F primarily funded by them.

See also RRIS 12A 081788.

##### REFERENCES:

Study of Class 105A Tank Cars (Population and Accidents) Phillips, EA; Role, H., AAR Technical Center, Aug. 1980, R-433



PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

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: Feb. 1981 START DATE: 1979

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 12 316078

##### SCALE MODEL EXPERIMENTS FOR ENVIRONMENTAL AND SAFETY CONTROL ASSESSMENTS OF ENERGY MATERIAL SHIPPING CONTAINERS SYSTEMS

The scope of work covered in this program is the development of experimental data and analysis of the structural response of spent fuel and high-level waste transportation systems to assess the effects of accident environments on safety and potential environmental consequences. The approach used in this program is to conduct a few carefully selected experiments for specified container accident conditions, and simulated environments. The containers used in the current experiments are replica scale models of typical spent fuel and high-level waste shipping casks. These experiments are being closely coordinated with LASL to provide the most relevant baseline data for subsequent correlation of the computer codes being developed there.

PERFORMING AGENCY: Battelle Memorial Institute

INVESTIGATOR: Robins, RA

SPONSORING AGENCY: Department of Energy, Office of Health and Environmental Research, 800045

STATUS: Active NOTICE DATE: June 1980 START DATE: 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 539)

#### 12 319915

##### CONSTITUTIVE DESCRIPTION FOR ENVIRONMENT AND SAFETY CONTROL ASSESSMENTS OF ENERGY MATERIALS SHIPPING CONTAINERS (ABBREV)

This program encompasses a number of objectives that, while interrelated in their ultimate application to energy system shipping container design and evaluation, are best pursued as separate technical tasks. The overall objective is the development of constitutive descriptions for the materials used in shipping container systems with particular emphasis on the modeling of rapid transient loading. These descriptions and the related containment failure analyses and experiments will provide the basis for developing a rational margin of confidence in such container systems. To achieve this overall objective, the scope of effort has been divided as follows: Task A--Assessment and Application of Endochronic Plasticity Theory for the Dynamic Analysis of Energy Materials Shipping Containers; Task B--Failure Analysis of Energy Materials Shipping Containers, Analytic Representation of Dynamic Failure Modes and Effects; Task C--Constitutive Representation of Thermal/Structural Interactions; Task D--Analytical Methods Development for Estimating and Bounding Structural Damage to Energy Materials Shipping Containers; Task E--Development of Analysis Support Experiments; and Task F--Design Optimization of Energy Materials Shipping Containers Subjected to Extreme Loading Conditions. Lin, H.C., B.J. Hsieh and R.A. Valentin, The Use of Endochronic Plasticity Theory in Modeling the Dynamic Inelastic Response of Shipping Containers: A Preliminary Assessment, Proceedings of 5th International Symposium on Packaging and Transportation of Radioactive Materials, Las Vegas, May 1978.

PERFORMING AGENCY: Argonne National Laboratories; Department of Energy, Division of Environmental Control Technology

INVESTIGATOR: Valentin, RA Lin, HC

SPONSORING AGENCY: Department of Energy, Division of Environmental Control Technology, 800193 W-31-109-ENG-38

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Sept. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 34)

#### 12 319918

##### RISK ASSESSMENT AND TESTING

The objective of the Transportation Safety Studies project is to assess the risks to man and the environment from the transport of energy materials. The study encompasses essentially all transportable energy materials and transportation modes with emphasis on nuclear fuel cycle materials.

State-of-the-art risk assessment methods such as fault tree analysis are used in the study. The program output will be a series of reports on the risks in transporting particular energy materials by particular transport modes. The reports will provide: (1) a quantitative evaluation of the risk, (2) information to assist society in determining the acceptability of the risk, and (3) an indication of the principal contributors to the risk. This will provide direction on methods to change the transport system should the risk be judged unacceptable by society.

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs; Department of Energy

INVESTIGATOR: Rhoads, RE

SPONSORING AGENCY: Department of Energy, 800041 EY-76-C-06-1830

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Oct. 1976

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 608 3)

#### 12 324509

##### MISSISSAUGA EVACUATION RESEARCH PROJECT

Phase I began with an immediate post-evacuation survey of 1,000 households evacuated after train derailment released chlorine gas on Nov. 10, 1979. Registered were (1) individual behavior during and after evacuation; (2) individual decisions and information used; (3) assessment of risk; (4) experience and learning from the event; (5) problems encountered during evacuation. Phase II repeats all those elements, as well as economic aspect of evacuation and study of individuals in evacuation centers and on the periphery of the evacuation.

##### REFERENCES:

The Mississauga Train Derailment and Evacuation: November 10-17, 1979, Event Reconstruction & Organizational Response, Timmerman, P, EER-6 40p, May 1980

Preliminary Report on Survey of Households Evacuated During the Chlorine Gas Emergency, Whyte, A; Liverman, D; Wilson, J, ERR-7 44p, May 1980

PERFORMING AGENCY: Toronto University, Canada, Institute for Environmental Studies

INVESTIGATOR: Burton, I Whyte, A

SPONSORING AGENCY: Office of the Solicitor General

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Nov. 1979

ACKNOWLEDGMENT: Toronto-York University Joint Program in Transp

#### 12 325452

##### STANDARDIZED ANALYSIS OF FUEL SHIPPING CONTAINERS

The goal of this project is a system of unified computer programs for the standardized safety analyses of nuclear fuel shipping containers and other equipment associated with the nuclear fuel cycle. The initial version of the SCALE system (Standardized Computer Analysis for Licensing Evaluation) performs multidimensional criticality safety and shielding analyses. An advanced version of SCALE will include heat transfer analyses. It will also include an interactive capability for specifying input and a deliberate capability for establishing inter-modular execution paths.

PERFORMING AGENCY: Oak Ridge National Laboratory

INVESTIGATOR: Whitesides, GE

SPONSORING AGENCY: Nuclear Regulatory Commission

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Feb. 1976 COMPLETION DATE: Oct. 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CU 811 4)



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 undertaken. 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-84290

STATUS: Active NOTICE DATE: Mar. 1981 START DATE: Jan. 1979 COMPLETION DATE: Apr. 1981

ACKNOWLEDGMENT: FRA

13 329573

**LOW COST CATENARY CONCEPT ANALYSIS**

The objective of this activity is to determine if the electrification system described in U.S. Patent No 3,829,631 is technically feasible and more economical to be built than conventional railroad electrification systems.

PERFORMING AGENCY: American Electric Power Service Corporation

INVESTIGATOR: Retallack, R Tel (212) 440-8514

SPONSORING AGENCY: Federal Railroad Administration; Department of Energy

RESPONSIBLE INDIVIDUAL: Kamalian N Tel (202) 426-9564

CONTRACT DOT-DTSR53-80-C00045

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1980 COMPLETION DATE: Aug. 1981 TOTAL FUNDS: \$110,000

ACKNOWLEDGMENT: American Electric Power



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, 1875 Eye Street, NW, Suite 200

INVESTIGATOR: Dunphy, R Tel (202) 223-6800

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: Steinmann, R Tel (202) 472-5140

Contract DC-09-7001

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1983 TOTAL FUNDS: \$1,500,000

ACKNOWLEDGMENT: UMTA

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 opening in 1979 concentrated on obtaining "before" and base-case data on the impacts of construction. Operational impact measurement began in 1979.

PERFORMING AGENCY: Atlanta Regional Commission

INVESTIGATOR: Stone, J Tel (404) 656-7700

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: Steinmann, R Tel (202) 472-5140

Contract GA-09-7002

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1983

ACKNOWLEDGMENT: UMTA

15 188644

**SOCIOECONOMIC IMPACTS RELATED TO THE PLANNING, CONSTRUCTION AND OPERATION OF URBAN TRANSPORTATION TUNNEL PROJECTS**

The objective of the study is to investigate the social and economic impacts arising from the planning, construction and operation of transportation tunnels. These tunnels can be either highway tunnels or mass transportation (subway) tunnels. Only tunnels in urban areas are being studied. The work consists of three phases. Phase I identified and listed impacts, using as source materials 100 recent EISs, as well as other relevant literature, particularly that concerning citizen involvement. Phase II will begin with the measurement of the identified impacts. Existing measurement methods will be utilized where possible, new measurement devices will be suggested where needed and feasible, and impacts that are not capable of being quantified will be so identified. An impact prediction model will then be constructed. In Phase III, the impact prediction model will be tested as to both applicability and reliability. Impacts will be predicted in a real-life situation in order to determine whether the model can actually be used by planners.

PERFORMING AGENCY: ABT Associates, Incorporated

INVESTIGATOR: Wolff, PC

SPONSORING AGENCY: Federal Highway Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: May 1981

15 188646

**URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES TRANSPORTATION TASK FORCE--THIRD YEAR**

This activity will develop a prioritized and augmented set of transportation needs as seen by the nation's largest cities and urban counties. A set of summary bulletins on these needs will be developed and disseminated. Summary briefs on DOT demonstrations in priority areas will be prepared and distributed. Information packages on handicapped and elderly transportation transit pricing and transit systems performance will also be disseminated. Additional work is planned on urban transportation planning, center city transportation and joint development.

**REFERENCES:**

Transit Actions (Preliminary Version) Dec. 1978

Progress Report Dec. 1978

Transit Actions Final Version, Oct. 1979

Transit Pricing Techniques to Improve Productivity June 1979

Elderly and Handicapped Transportation: Local Government, Approaches, Mar. 1979

Elderly and Handicapped Transportation: Chief Executives Summary, Sept. 1979

Elderly and Handicapped Transportation: Information Sourcebook, Sept. 1979

Elderly and Handicapped Transportation: Eight Case Studies Sept. 1979

PERFORMING AGENCY: Public Technology, Incorporated

INVESTIGATOR: Barrett, G Tel (202) 452-7839

SPONSORING AGENCY: Office of the Secretary of Transportation; Urban Mass Transportation Administration; Federal Highway Administration; National Highway Traffic Safety Administration

RESPONSIBLE INDIVIDUAL: Linhares, AB Tel (202) 426-4208

Contract DOT-OS-80060

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1978 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$1,500,000

ACKNOWLEDGMENT: DOT

15 188656

**METHODS FOR THE PREDICTION OF TRANSPORTATION SYSTEM IMPACTS**

Identify and discuss procedures used in predicting impacts of major public transportation investments. Provide guidance for predicting impacts during system planning and alternatives analysis, focusing on those impacts which can be used by UMTA to decide which urban corridors are most worthy of study and which transit alternatives are the most cost-effective.

**REFERENCES:**

Draft Monograph: Inventory of Impacts and Measures for Prerequisite and Alternatives Analysis, Nov. 1978

Draft Monograph: Economic Development Impacts Nov. 1978

Draft Monograph: Energy Impacts Nov. 1978

Draft Monograph: Energy Impacts Jan. 1979

Draft Monograph: Travel Impacts Revision, Jan. 1979

Preliminary Draft Report: Economic Impact Assessment of Transit Construction and Related Considerations, Aug. 1979

PERFORMING AGENCY: Charles River Associates, Incorporated

INVESTIGATOR: Brand, D Tel (617) 266-0500

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Jacobs, M Tel (617) 494-2275

CONTRACT DOT-TSC-1572

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$82,000

ACKNOWLEDGMENT: Charles River Associates, Incorporated

15 319083

**THE CHALLENGE OF POTENTIAL LOSS OF RURAL RAIL FACILITIES OR TRANSPORTATION SYSTEMS**

Develop an "early warning" community decision strategy for leaders to identify problems, opportunities and pre-crisis planning. Design model criteria for evaluation of transportation alternatives to serve agriculture, agri-business and citizens. Develop components of a community decision model to provide economic tools, impact data, preventative action, key indicators, alternative solutions, and generate community support. Identify critical transportation service needs for agriculture, agri-business, communities and people. Staff will identify critical location for study and relevant data for research model on the Milwaukee Road corridor from Madison to Prairie du Chien. Staff will contact shippers, receivers, agricultural leaders, community, government agencies. Collected data from primary sources and secondary sources including regional planning commission and rail planners at the Department of Transportation. Staff will develop an economic impact model for early warning of communities threatened with a loss of transportation facilities. Prepare guidelines to assist community leaders in developing programs for transportation.

PERFORMING AGENCY: Wisconsin University, Madison, Department of Agricultural Economics, WISM040

INVESTIGATOR: Vilstrup, RH Cottingham, J Eldridge, C

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, SAES WIS

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1979 COMPLETION DATE: June 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0080875)

15 319092

**IMPACTS OF COAL DEVELOPMENT ALTERNATIVES**

Identify alternative method of utilizing western North Dakota lignite resources to meet energy needs. Identify and evaluate effects of alternative development patterns on local economic activity. Identify the factors that affect the level and pattern of development of North Dakota lignite. Identification of technically feasible coal development alternatives and estimation of resource requirements and costs for each will be accomplished through the analysis of secondary data on natural energy needs, supplies of energy resources in other regions, and transportation costs for various energy forms. Engineering estimates available from secondary sources will be valuable in determining costs and resource requirements. Economic impact analyses will be made for each development alternative. Income, employment, and population projections will be used to estimate and identify economic and social impacts.

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND03332

INVESTIGATOR: Leistritz, FL Hertsgaard, TA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, SAES ND

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1973 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0064440)

15 329551

**SOCIAL IMPACTS OF TRANSPORTATION IN CANADA**

The work is to develop a consistent clarification of social impacts, reflecting the linkages that exist among the processes of urbanization, economic growth, transportation development and social change, as well as the historical relationships in Canada between transport investment and population redistribution.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-071

INVESTIGATOR: Moore, E Tel (613) 547-6116 Yeates, M Holmes, J Osborne, B Spector, A

SPONSORING AGENCY: Canadian Transport Commission, Research Branch

RESPONSIBLE INDIVIDUAL: Mozersky, KA Tel (613) 997-2691

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1980 COMPLETION DATE: Oct. 1981 TOTAL FUNDS: \$14,994

ACKNOWLEDGMENT: CIGGT

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/

A report is currently being drafted.

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. 1981 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 193782

**EMERGENCY CONSERVATION PLANS TO REDUCE DEMAND FOR FUEL**

This is a follow-on project to develop Standby Federal Conservation Plans for Transportation in the event of a severe energy supply interruption. Guidelines are also being developed to assist states in the development of local and statewide transportation contingency strategies. This effort is part of the response by the Department of Energy to the Emergency Energy Conservation Act of 1979. The MIT effort does not include the development of a rationing program, which is also mandated by the 1979 legislation. The MIT effort involves the generation and evaluation of alternative contingency measures.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Humphrey, TF

SPONSORING AGENCY: Department of Energy

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1980 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Massachusetts Institute of Technology

16 196727

**INTERCITY INTERMODAL SYSTEMS**

Develop an intermodal strategy aimed at increasing energy efficiency of passenger transport. 1. Develop a methodology to determine comparative measures of energy efficiency as a function of mode. 2. Apply results of intermodal energy studies to Ministry Multimodal planning initiatives (e.g. Southern Ontario passenger study).

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A12308

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1977 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 196749

**ALTERNATIVE FUELS IN MEDIUM SPEED DIESEL ENGINES**

The joint program (DOE, FRA, AAR) is exploring the use of alternative fuels for locomotive diesel engines with a two cylinder experimental engine

of SWRI. As currently planned, the small engine tests will be followed by tests of candidate fuels in both a two-cycle and four-cycle full size diesel engine. Current fuels under evaluation include off-specification diesel fuels and non-diesel fuels such as alcohols and synthetic liquid fuels derived from coal, shale or tar sands. The fuels will be tested for engine performance, combustion characteristics, emission levels and piston ring wear.

**REFERENCES:**

Alternative Fuels for Medium Speed Diesel Engines. Phase I Storment, JO; Baker, Q: Wood, C, Southwest Research Institute, Draft Final Rpt., May 1980, FRA/ORD-80/40.I

PERFORMING AGENCY: Southwest Research Institute, AR-8163

INVESTIGATOR: Storment, JO Tel (512) 684-5111 Baker, QA Wood, CD

SPONSORING AGENCY: Department of Energy, Office of Transportation Programs; Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Alpaugh, RT Tel (202) 252-8012 Koper, JM Tel (202) 426-0808 Furber, CP Tel (202) 293-6256

CONTRACT DOE-EM-78-C-01-4266

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1978 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$880,000

ACKNOWLEDGMENT: FRA

16 315155

**STUDY OF ALTERNATE FUELS/ENERGY SOURCES TO NON-HIGHWAY TRANSPORTATION**

The objective is to assess the potential for implementation of alternative fuels in non-highway transportation systems in the near, mid and far time frames. The methods employed are to: (1) survey existing information of prime movers and fuels; (2) rank R and D needs through assessing energy source and fuel availability, performance and systems compatibility, capital requirement and economics, environment and safety impacts, and military and foreign fuels compatibility; and (3) recommend a research and development program. DOE-TEC opportunities to aid implementation of alternate fuels with high technological compatibility with prime movers, favorable cost per unit energy saved, and high potential for utilization will be identified.

PERFORMING AGENCY: Exxon Research and Engineering Company, Government Research Laboratory

INVESTIGATOR: Cart, EN, Jr

SPONSORING AGENCY: Department of Energy, Division of Transportation Energy Conservation, EC-77-C-05-5438

**Contract**

STATUS: Active NOTICE DATE: July 1980 START DATE: Sept. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 1123)

16 323370

**RAIL TECHNOLOGY/LOCOMOTIVES**

Review of design and operating factors which influence energy consumption by railway locomotives. Emphasis will be placed on developing improved fuel measuring facilities for locomotives and conducting fuel measuring experiments relating fuel consumption to operational factors. Develop locomotive fuel consumption and work output data acquisition system and collect over-the-road fuel performance data. Identify and assess new fuel efficient locomotive engine designs.

PERFORMING AGENCY: Transport Canada Research and Development Centre, 050GE

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Johnson, WF

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Apr. 1979 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 323375

**RAIL TECHNOLOGY/FREIGHT CARS ENERGY CONSERVATION**

Identify, develop, test and evaluate appropriate technical measures related to rail freight car technology which indicate a potential to conserve energy in intercity rail transport. Support prototype testing of steerable railcar trucks for use on heavy freight cars.

PERFORMING AGENCY: Transport Canada Research and Development Centre, 052GE  
 SPONSORING AGENCY: Transport Canada Research and Development Centre  
 RESPONSIBLE INDIVIDUAL: Johnson, WF  
 STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Apr. 1979 COMPLETION DATE: Mar. 1981  
 ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 323376

**LOCOMOTIVE FUEL CONSUMPTION MEASURING DEVICE**

Design and manufacture a fuel consumption measuring device for locomotives. Use device to test fuel savings possible from various add on devices, handling techniques, fuel additives, and velocity and h.p./ton ratio changes.

PERFORMING AGENCY: Canadian Pacific Limited, Q012IE  
 SPONSORING AGENCY: Canadian Pacific Limited  
 RESPONSIBLE INDIVIDUAL: Preston, C

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Jan. 1980 COMPLETION DATE: Dec. 1982

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 323377

**INTERCITY RAIL**

Explore system/operational options to improve energy efficiency of passenger rail. Investigate energy characteristics of future high performance rail services; estimate energy contribution resulting from introduction of these services.

PERFORMING AGENCY: Transport Canada Research and Development Centre, 051GE  
 SPONSORING AGENCY: Transport Canada Research and Development Centre  
 RESPONSIBLE INDIVIDUAL: Johnson, WF

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Apr. 1979 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 325455

**WASTE OIL RECYCLING**

This project is directed toward the commercial demonstration and implementation of a new process for the recovery of used automotive lubricating oil. The conventional acid/clay re-refining process has become environmentally unacceptable, sharply curtailing the amount of used oil which can be re-refined. Laboratory tests have indicated the technical feasibility of the new two-stage distillation, solvent precipitation process. In this process, all distillate and precipitate fractions of the waste oil are potentially recovered as useful products. Each year, about 650 million gallons of used automotive lube oil are disposed. If the planned commercial-scale demonstration succeeds in fully implementing the used oil recovery process, approximately 14 million barrels of oil equivalent per year could be saved. This project was initiated in FY 78 and is being conducted by the Bartlesville Energy Research Center. Major milestones in FY 80 are design completion and selection of a re-refining plant site. Facility construction is expected to begin in the late summer of FY 81 with plant startup approximately one year later. Commercial operation is scheduled to commence in the second quarter of FY 83.

PERFORMING AGENCY: Department of Energy, Bartlesville Energy Technology Center  
 INVESTIGATOR: Thompson, CJ  
 SPONSORING AGENCY: Department of Energy

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1977 COMPLETION DATE: Sept. 1983

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (FE 1533)

16 329550

**FEASIBILITY STUDY OF DEVELOPING AN ENERGY CONSUMPTION TRAIN PERFORMANCE CALCULATOR**

The feasibility of developing a train simulation computer program which is capable of accurately predicting energy intensity will be investigated. Train resistance, locomotive efficiency and train handling techniques will be analyzed in relation to their effects on energy intensity. A systems design will be recommended for both diesel-electric and electric operations.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-090

INVESTIGATOR: English, G Tel (613) 547-5777 Young, J Schwier, C  
 SPONSORING AGENCY: Ministry of Transport, Canada, Railway Transportation Directorate

RESPONSIBLE INDIVIDUAL: Ganton, T Tel (613) 992-9197

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Sept. 1980 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$36,000

ACKNOWLEDGMENT: CIGGT

16 329561

**ENERGY AUDIT AND EVALUATION**

This study will develop approaches to minimizing energy consumption without reducing safety or quality of service. With the cooperation of a New England railroad, an audit of energy in transportation and non-transportation usage has been conducted. Conservation options will be developed in parallel with the audit. Tests will be conducted to verify the options and followed by the dissemination of results through project reports, an energy conservation manual, and an Energy Management Workshop to be held in September 1981.

**REFERENCES:**

Baseline Fuel Consumption Tests on the Boston & Maine Railroad, Interim Rpt.

Evaluation of Freight Train Energy Conservation Options on the Boston & Maine Railroad, Hitz, J; McGrath, T; Dorer, R, Transportation Systems Center, Interim Rpt., Dec. 1980

Technical Proceedings of the Energy Management Workshop Kearney, (AT) Incorporated, FRA/ORD-80/18 12p, Nov. 1979, PB80-144975

PERFORMING AGENCY: Transportation Systems Center  
 INVESTIGATOR: Coulombre, R Tel (617) 494-2540 Hitz, J Dorer, R  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Koper, J Tel (202) 426-0808

CONTRACT DOT-PPA-RR-152

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1979 COMPLETION DATE: Oct. 1981 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: FRA

16 329563

**ASSESSMENT OF THE IMPACT OF GRAVITY-ASSISTED GUIDEWAYS ON URBAN RAIL TRANSIT SYSTEMS**

This project involves the investigation and assessment of the impact of gravity-assisted guideways on urban rail transit systems. It will establish design criteria to assure acceptable system performance, reliability and safety. Within the limits of the acceptable design criteria, key variables such as geology, dip grade and distance between stations will be examined, and their effect on the costs of system construction, operation and maintenance estimated. Finally, the gravity-assisted guideway designs will be compared to recently built transit systems in cost, performance, reliability and safety.

PERFORMING AGENCY: Jet Propulsion Laboratory, CA-06-0144  
 INVESTIGATOR: Dayman, B Tel (213) 354-9456  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Butler, G Tel (202) 426-0090

CONTRACT UMTA-CA-06-0144

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1980 COMPLETION DATE: July 1981 TOTAL FUNDS: \$150,000

ACKNOWLEDGMENT: Jet Propulsion Laboratory

16 329577

**TRAIN ENERGY USE AND FUEL CONSUMPTION TEST PROJECT**

Analyze the energy use characteristics of various Amtrak train consists and use the data to assess where energy use may be improved. The information will be useful to Amtrak in day-to-day train operations and to both Amtrak and the FRA/NECIP in responding to public and Congressional inquiries. Selected trainsets in the Amtrak route consumption structure will be carefully instrumented to obtain energy consumption during a revenue run. The operational procedures and route characteristics will be analyzed. When conditions warrant a Train Performance Calculator run to assist in data analysis will be conducted.

PERFORMING AGENCY: Transportation Systems Center; ENSCO, Incorporated; Klauder (Louis T) and Associates  
 INVESTIGATOR: Coulombre, RE Tel (617) 494-2540 Michaels, W Tel



(703) 960-8500 Watson, R Tel (215) 563-2570

SPONSORING AGENCY: Federal Railroad Administration; National Railroad Passenger Corporation

RESPONSIBLE INDIVIDUAL: Woll, TP Tel (202) 426-9564 Inglett, G  
Tel (202) 383-3146

CONTRACT DOT-TSC-PPA-032

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June  
1980 COMPLETION DATE: Dec. 1982 TOTAL FUNDS: \$450,000

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:**

- Project Work Plan Mar. 1976
- State-of-the-Art Survey FRA-OPPD-76-5, Apr. 1976
- System Functional Requirements FRA-OPPD-77-10, July 1977
- System Performance Measurements FRA-OPPD-78-9, Feb. 1978
- Orientation Module FRA-OPPD-80-2, Mar. 1980
- Advanced Systems Study FRA-OPPD-80-4, June 1980

PERFORMING AGENCY: Missouri Pacific Railroad Company

INVESTIGATOR: Sines, GS

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280

Contract DOT-FR-65139

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Nov. 1975 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$5,500,000

ACKNOWLEDGMENT: FRA

17 159625

**FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM-STRUCTURING ORGANIZATIONAL CONTROL MECHANISMS**

The program has completed a report on organizational control mechanisms to facilitate integrated car management. It has translated the basic concepts of this report into a presentation which it will deliver to management personnel on selected railroads.

**REFERENCES:**

- Alternatives for Improving Freight Car Management Task Force I, Phase II, Freight Car Utilization Program, AAR R-426 38p, Apr. 1980

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Muehlke, RV

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280 Taylor, CE Tel (202) 293-4084

CONTRACT DOT-FR-771-5279

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$55,000

ACKNOWLEDGMENT: AAR

17 159628

**FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM-INDUSTRYWIDE FREIGHT CAR MANAGEMENT**

The Program will monitor, evaluate and promote the multi-level car management project. Draft and publish a report on the project. Assist in the expansion of the concept to other railroads, car types, commodities or shippers when this becomes feasible. The Program will work with key individuals and committees in the industry to promote arrangements such as the Clearinghouse for pooling general service cars. Part of the promotion will entail specifying the car grading system in greater detail in response to comments and questions from the industry. This program will also be prepared to develop computer software to assist these activities.

**REFERENCES:**

- Alternatives for Improving Freight Car Management AAR R-426 37 p., Apr. 1980

A Technique for Conducting an Internal Review of Freight Car Management, Reebie Associates, July 1980

Management Alternatives to the Challenge of Railcar Utilization, Reebie Associates, 58 p., Oct. 1979

A Technique for Assessing the State of Railcar Management 42 p., Dec. 1979

Proposal for Change in the Railroad Industry-Wide Car Management System, AAR R-379 59 p., June 1979

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Muehlke, RV

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280 Taylor, CE Tel (202) 293-4084

CONTRACT DOT-FR-53-80-C-50005

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Aug. 1981 TOTAL FUNDS: \$100,000

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 reasonably accurate but timely cost and resource usage information on demand. Current progress involves a compilation of the program on other systems and preparation of the package manual.

**REFERENCES:**

- Handbook of Critical Path Law, CE; Lach, DC, Published by the Authors, 9th Printing, 1975

Project Management and Cost/Budget Control Law, CE, AREA Conference, Pittsburgh, Penn, 19-20 Oct 1976.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-825

INVESTIGATOR: Law, CE Tel (613)547-5777 Lockhart, M Bryce, JS

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: Law, CE Tel (613)547-5777

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Aug. 1967 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: CIGGT

17 188645

**TARIFF MODERNIZATION PROGRAM--PHASE II**

This industry-wide program, involving shippers, carriers and tariff publishers, is planned to convert the requirements developed in Phase I into specific recommendations and solutions for simplifying, modernizing and improving the presentation of transportation tariff information. The plan contains tasks for nine technical work groups, each of which will require the support of experienced tariff and systems personnel.

PERFORMING AGENCY: Transportation Data Coordinating Committee

INVESTIGATOR: Guilbert, EA Tel (202) 293-5514

SPONSORING AGENCY: Transportation Data Coordinating Committee

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Jan. 1979

17 188651

**LOCOMOTIVE DATA ACQUISITION PACKAGE (LDAP)**

The objective is to develop a preprototype sophisticated, rugged and portable Locomotive Data Acquisition Package (LDAP) for line-haul data recording and analysis directly on board the locomotive. Currently such systems do not exist. This system will be used to systematically monitor, define, and analyze those parameters directly affecting locomotive operational efficiency and reliability. The preprototype system is being tested in revenue service operations on several railroads in a series of experiments designed to improve energy consumption.

A workshop was held December 1980 for the railroad industry and other interested parties.

**REFERENCES:**

- Locomotive Data Acquisition Package, Phase I Abbott, RK; Kirsten, FA; Mullen, DR; Turner, DB, Lawrence Berkeley Laboratory, Available from NTIS, FRA/ORD-78/68; LBL-45 119p, Sept. 1978

Locomotive Data Acquisition Package, Phase II System Development. Final Report. Volume I-System Overview, Abbott, RK; et al, Lawrence Berkeley Laboratory, FRA/ORD-80/39.I 136p, May 1980

Locomotive Data Acquisition Package, Phase II System Dev. Final Rpt. Vol. II - LDR Operations & Maintenance, Abbott, RK; et al, Lawrence Berkeley Laboratory, FRA/ORD-80/39.II 107p

PERFORMING AGENCY: California University, Berkeley  
 INVESTIGATOR: Scalise, DT Tel (415) 843-2740 X5055  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

IA AR-DOT-FR5380X0073

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Mar. 1980 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$533,000

ACKNOWLEDGMENT: FRA

17 196726

#### FREIGHT SYSTEMS IMPROVEMENTS (YARDS)

Automated data handling and control techniques in rail yard operations will be tested and evaluated in operations, with a view to extend the concept to other applications.

PERFORMING AGENCY: Transport Canada Research and Development Centre, F34A55122

INVESTIGATOR: Rudback, NE

SPONSORING AGENCY: Transport Canada Research and Development Centre

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1980

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

17 196741

#### INTERMODAL MANAGEMENT INFORMATION SYSTEM PHASE II AND III

To complete the development of an intermodal management information system (IMIS) as part of the FRA intermodal freight program. Three distinct modular systems have been developed: intermodal equipment control system; repetitive waybilling and rating system; and, profitability reporting system. Phase I and Phase II have been completed. Phase III, in progress, includes the development of baseline specifications, detailed design, programming and implementation on a major railroad. When the system has been in operation for four months a post audit will be conducted to ensure it is performing as intended. Final reports including programs and documentation will be made available to the industry.

PERFORMING AGENCY: PRC Systems Sciences Company

INVESTIGATOR: Peternick, J Tel (202) 893-1800 Fredrickson, V Pflugrad, A Rynders, B

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Brooks, WR Tel (202) 472-1015

Contract DOT-FR-741-5157

STATUS: Completed NOTICE DATE: Mar. 1981 START DATE: Sept. 1977 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: \$1,395,000

17 315154

#### RESEARCH INITIATION-CALIBRATION OF A MULTI-PATH FLOW MODEL FOR RAIL FREIGHT TRAFFIC

This research project is directed toward testing a multiple parameter, multi-path assignment algorithm, developed previously by the principal investigator, with actual flow data for the U.S. railroad system. Seven tasks are included: (1) creation of an abstract rail network representing several corridors with multiple routes, using the Federal Railroad Administrations network model (2) development of a traffic flow data base from the Waybill-Junction Sample data file of the Interstate Commerce Commission (3) assignment of cost functions to links and nodes of the network model (4) calibration of the model, including estimation of parameters (5) examination and interpretation of the parameter values as they relate to network conditions, market conditions, and routing decisions (6) application of the calibrated model to modified networks and (7) report preparation.

PERFORMING AGENCY: Princeton University, School of Architecture and Urban Planning

INVESTIGATOR: Lutin, JM

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG78-05442

STATUS: Active NOTICE DATE: July 1980 START DATE: Apr. 1978 COMPLETION DATE: Mar. 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6865 1)

17 316059

#### QUEUEING SYSTEMS-NETWORKS OF QUEUES AND QUEUES WITH PERIODIC POISSON INPUT

Queueing network systems abound in applications. They appear in such areas as communications networks, computer time-sharing systems, maintenance and repair facilities, air-traffic control, medical-care delivery systems, and many production, assembly and inspection operations. Despite their immense importance, queueing network systems are still not completely understood. For example, the equilibrium behavior of these systems when subjected to nonstationary random inputs is not totally understood. This research considers random periodic Poisson inputs, and develops some approximate diffusion models for predicting steady-state behavior. Heavy connections between heavy traffic approximations and the analytical theory of Markov processes and diffusions are explored in order to obtain computationally tractable results.

PERFORMING AGENCY: Systems Control, Incorporated

INVESTIGATOR: Lemoine, AJ Harrison, JM

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG78-24568

STATUS: Active NOTICE DATE: June 1980 START DATE: June 1979 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: \$84,344

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 7449)

17 324510

#### AUGMENTATION OF FREIGHT TRANSPORTATION DATA SETS

The benefits and costs of augmenting current freight transportation flow data will be investigated. Current incompatibilities and deficiencies with respect to time, space and commodity types will be identified so they may be rectified. Potential means for accomplishing this objective entail centralized data collection, communication and coordination of various data collection efforts, marginal collection of data by existing collectors and merging of existing data sets. The above means will also be appraised under differing circumstances. Another objective is investigation of existing sources of data collected for any purpose as potential generators of information on transportation commodity flows.

PERFORMING AGENCY: Pennsylvania University, Philadelphia

INVESTIGATOR: Allen, WB

SPONSORING AGENCY: Department of Transportation

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1980

17 325449

#### NETWORK ANALYSIS AND OPTIMIZATION

This research is concerned with the systems analysis of structural characteristics and solution methods for large-scale combinatorial network optimization problems. Network optimization problems have applications to computer networking, communication planning, economic and energy equilibrium analysis, logistics, and transportation. The research involves three separate, but overlapping, areas: (a) model formation and decomposition methods for combinatorial network optimization problems; (2) probabilistic analysis of large combinatorial network optimization problems; and (3) equilibrium analysis on congested networks that arise in settings such as communication, economics (spatially separated markets), transportation, and water resources planning. These topics are related by the facts that (1) each focuses on network applications. (2) each involves problem decomposition, and (3) each has combinatorial characteristics that result in easily identifiable and easily solvable components, such as shortest route or assignment subproblems. The analysis of these problems relies on combinatorial methodology such as Lagrangian relaxation, resource directive decomposition, and fixed point theory, as well as on ergodic methods from probabilistic theory. This is the first year of a 3-year continuing grant.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Magnenti, TL

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1980 COMPLETION DATE: Oct. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ECS 79-26225)



17 325450

**DECOMPOSITION TECHNIQUES FOR NONLINEAR COST  
MULTICOMMODITY FLOW PROBLEMS**

Nonlinear cost multicommodity flow problems arise in many applications such as traffic scheduling and packet switching. In such applications, networks with thousands of arcs and nodes are not uncommon. This project develops nonlinear decomposition methodologies for solving large-scale flow scheduling problems. The scope of work includes theoretical development, computational testing, and the development of heuristic variations. The research investigates both transfer decomposition and subset decomposition techniques, and the analytical and computational aspects of the solution algorithms are studied. The sensitivity of the method to the choice of the subnetworks in the decomposition is explored. Computational testing and demonstration of the resulting algorithms are performed using Department of Transportation data. This is the first year of a 2-year continuing grant.

PERFORMING AGENCY: Florida University, Gainesville

INVESTIGATOR: Hearn, DE

SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, ECS79-25065

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1980 COMPLETION DATE: Oct. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (EZ 368)

17 329575

**LOCOMOTIVE FAILURE REPORTING AND ANALYSIS  
SYSTEM**

The objectives are to develop a failure reporting and analysis system (FRAS) to be used to record the experience obtained with the Amtrak AEM-7 electric locomotive being tested at the Transportation Test Center (TTC) in Pueblo, Colorado. The FRAS is designed to document the operational record of the AEM-7 locomotive as it is being endurance tested at the TTC. The documentation will provide a quantitative history of the reliability and availability of the locomotive and will provide a data trail which can be used as an aid to correct chronic problems.

## REFERENCES:

A Failure Reporting and Analysis System for the AEM-7 Locomotive Test Program, Available from Transportation Systems Center, Draft Report

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Wlodyka, R Tel (617) 494-2143

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Woll, TP Tel (202) 426-9564

CONTRACT DOT-TSC/PPA-032

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Feb. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$55,000

ACKNOWLEDGMENT: FRA



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: Sept. 1980 START DATE: Oct. 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$98,062

ACKNOWLEDGMENT: TRAIS (NY-11-0003)

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 procedures.

## REFERENCES:

Railway Costing Study, Phase I Report Canadian Transport Commission, Aug. 1977

Railway Costing Study, Phase II, Draft Canadian Transport Commission Railway Costing Study-Report on Phase II Canadian Transport Commission, 5 Volumes, Oct. 1979

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-828

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Schwier, C Roney, MD Bunting, MD

SPONSORING AGENCY: Canadian Transport Commission

RESPONSIBLE INDIVIDUAL: Lake, RW Tel (613) 547-5777

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: May 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$240,000

ACKNOWLEDGMENT: CIGGT

18 177624

**COSTING OF RAIL SERVICE**

Development of new methods for obtaining an empirical understanding of the costs or providing various types of rail service. Using mathematical techniques based on engineering principles and statistical analyses based on cost and output data, hybrid techniques will be developed to examine the relation between output and costs. A relatively simple rail operation will be identified where commodities are relatively homogenous, the network is simple and terminal activities are as uncomplicated as possible. An example might be a train service moving grain from a country elevator to a river terminal.

PERFORMING AGENCY: Northwestern University, Evanston, Transportation Center, 425

INVESTIGATOR: Daughety, AF Tel (312) 492-5183 Turnquist, MA

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70061

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1977 COMPLETION DATE: Oct. 1980 TOTAL FUNDS: \$123,996

ACKNOWLEDGMENT: Northwestern University, Evanston

18 193784

**UTILIZATION OF RESOURCES IN MULTI-MODAL TRANSPORTATION SYSTEMS**

A general theory of vehicle, labor and fixed facility resource utilization. Initial work to analyze the vehicle cycle and its economic implications. Case studies in cooperation with private carriers.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Manheim, ML

SPONSORING AGENCY: Office of the Secretary of Transportation

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Aug. 1977 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Massachusetts Institute of Technology

18 193786

**TECHNOLOGY AND MARKET STRUCTURE IN THE REGULATED TRUCKING INDUSTRY**

This research analyzes the costs of 250 regulated common carriers of general commodities over a ten-year period and performs a number of policy simulations utilizing alternative scenarios with respect to market structure. In addition, it documents the computer software needed to estimate the cost functions and performs the policy simulations.

## REFERENCES:

The Structure of Cost and Technology of Regulated Common Carriers of Other Special Commodities, Chiang, JSW, Sept. 1979

Market Structure and Industry Behavior of the General Commodity Carrier, Michael, G, Jan. 1980

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Friedlaender, AF

SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Feb. 1979 COMPLETION DATE: Oct. 1980 TOTAL FUNDS: \$64,390

ACKNOWLEDGMENT: Massachusetts Institute of Technology

18 319075

**RAIL WEAR ECONOMIC ANALYSIS**

As part of the TDC/FRA Joint Research Project Agreement in Freight Car Technology the objectives of this project are as follows: To achieve maximum practical cooperation and exchange of data on freight car truck technology; and To evaluate the rail renewal cost savings in typical U.S. and Canadian railway environments by adopting Type II trucks. Comparison is to be made using Truck Design Optimization Project (TDOP) dynamic performance measurements on Type II and conventional trucks as data input into the CIGGT Road Maintenance Cost Model computer program.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-930

INVESTIGATOR: McIlveen, ER Tel (613) 547-5777 Birk, AM Lake, RW

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Dibble, DW Tel (514) 283-4189

Contract O9SD.T8200-9-9526

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Jan. 1980 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$37,262

ACKNOWLEDGMENT: CIGGT

18 323379

**ECONOMICS OF TRANSPORT MANAGEMENT**

Development of a reference text on the applied economics of transport management, with 85 to 90 percent relation to freight and balance to passenger. It is intended to be a blend of academia and industry and thus will be of benefit to both areas. Both macro and micro examples will be used. Very few recent sources give application of economics for all modes. This will assist to alleviate this void.

PERFORMING AGENCY: British Columbia Institute of Technology, B002UD

SPONSORING AGENCY: British Columbia Institute of Technology

RESPONSIBLE INDIVIDUAL: Maitland, EY

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

18 324512

**IMPACTS OF VARYING BUDGETARY CONDITIONS ON LOCAL TRANSIT SYSTEM DECISIONS**

Based on data available at the University of Pennsylvania, the impacts of varying budgetary conditions on local transit systems and the effect of these decisions over time on the quality of transit service will be investigated. Carriers will include those with inadequate subsidies to cover normal operation, maintenance and replacement costs, as well as carriers with

surpluses or profits. Carriers include buses, streetcars, rapid rail and commuter rail. Many transit systems have reached the state of being unable to maintain normal service levels, much less expand capacity to accommodate expected increases in passenger traffic. New federal initiatives will be recommended.

PERFORMING AGENCY: Pennsylvania University, Philadelphia

INVESTIGATOR: Morlok, EK Viton, PA

SPONSORING AGENCY: Urban Mass Transportation Administration

70935

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1980



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 Intermodal Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Swerdloff, CN

Contract DOT-OS-40008 (CS)

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June 1973 TOTAL FUNDS: \$222,959

ACKNOWLEDGMENT: TRAIS (PR# PUR-2-30685)

20 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 and International Affairs; Office of Intermodal Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Swerdloff, CN Tel (202) 426-4163

Contract OS-70006

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Jan. 1977 TOTAL FUNDS: \$292,584

ACKNOWLEDGMENT: Massachusetts Institute of Technology

20 083533

## ECONOMIC ANALYSES 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.

### REFERENCES:

Comparison of the Marketing Systems of the U.S. and Canada Peltier, KA, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, 1977

Analysis of Wheat Quality Factors Mittleider, JF, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, 1977

An Economic Evaluation of Yield and Quality Differences Among Selected Hard Red Spring Wheat Varieties Ag. Econ., Mittleider, JF; Anderson, DE, NDSU, Agricultural Experiment Station, Report No. 121, 1977

An Analysis of the Relationships Among Specific Quality Characteristics for Hard Red Spring & Durum Wheat, Ag. Econ., Mittleider, JF; Anderson, DE, NDSU, Agricultural Experiment Station, Report No. 122, 1977

Marketing Canadian Wheat Anderson, DE, Presented Kansas Wheat Commission Marketing Seminar Apr 77, Unpublished Paper, 1977

The Canadian Grain Marketing System Peltier, KA; Anderson, DE, Dept of Agricultural Economics; Agricultural Experiment Stat, AER Rpt 130, 1978

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND01354

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1977 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: North Dakota State University (CRIS 0060238)

20 153650

## MULTI-MODAL, MULTI-STATE TRANSPORTATION SYSTEM EVALUATION

Evaluation of the feasibility of a multi-modal, multi-state corridor extending from Kansas City, Missouri to Jacksonville, Florida for the movement of goods and people. Project reports for 1st and 2nd years, including the test design and limited application have been completed. These reports are available upon request, from NTIS.

PERFORMING AGENCY: University of North Florida, Jacksonville, Department of Transportation and Logistics

INVESTIGATOR: Sharp, GS Tel (904) 646-2860 Smith, JA, Jr

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

Contract DOT-OS-60512

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Aug. 1978 COMPLETION DATE: June 1980 TOTAL FUNDS: \$950,000

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. The use of this model will enable us to scenario 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.

### REFERENCES:

Transportation Needs for Michigan Grains in 1985 and 2000 Thompson, SR, MSU Department of Agricultural Economics, Staff Paper 78-50, July 1978

Transportation Needs for Michigan Grains in 1985 and 2000 Thompson, SR, Michigan Farm Economics, No. 427, July 1977

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. 1980 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 intramodal competitive environment of the participating states.

##### REFERENCES:

Railroads, Grain Transportation and the Interstate Commerce Commission, Martin, M; Dahl, R

A Transportation Issue-Lock and Dam 26 Martin, M; Dahl, R

An Economic Analysis of the Social Cost of Regulated Value-of-Serv Wheat & Barley Rail Rates in the Upper Midwest, Martin, M

Social Costs of Regulating Grain Rail Rates in the Martin, M; Dahl, R, UMN-Agricultural Experiment Station

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, CSRS MIN

INVESTIGATOR: Dahl, RP Tel (612) 376-3436

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. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 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.

##### REFERENCES:

Estimating Barge Transportation Costs for Grain and Fertilizer, Moser, DE; Woolverton, ME, Agricultural Experiment Station, Research Bulletin 1029, 1978

Estimating Truck Transport Costs for Grain and Fertilizer Payne, WF; Baumel, CP; Moser, DE, Agricultural Experiment Station, Research Bulletin 1027, 1978

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, CSRS MO

INVESTIGATOR: Moser, DE Rudel, R

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, M000040-1

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070255)

#### 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. processors, feed mills, feedlots and wet corn millers

##### REFERENCES:

Importance of Wheat Exports to Kansas-Oklahoma-Texas Region and Utilized Transportation Modes, 1976-77, Fuller, S; Dezik, J, Texas Transportation Institute, Tech Note, 1978

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. 1980 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.

##### REFERENCES:

Projections of Production, Livestock Consumption and Transport Surplus of Five Grains in Okla, 1985, 1990, 2000, Johnson, MA, Oklahoma State Univ, Department of Agricultural Economics, AE 7809 16 p., 1978

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01648

INVESTIGATOR: Johnson, MA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS OKL

STATUS: Active NOTICE DATE: Aug. 1980 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.

##### REFERENCES:

Grain Production Projections in Ohio By Crop Reporting District and County 1984, 1989 and 1999, Larson, DW; Bedestenci, HC; Canlas, E, Ohio Agricultural R and D Center, Research Bulletin 1101, 1978

An Economic Analysis of Alternative Grain Distribution Systems in Western Ohio, Solomon, S, Ohio State University, Ph. D. Thesis 166 p., 1978

PERFORMING AGENCY: Ohio Agricultural R and D Center, Department of Agricultural Economics and Rural Sociology, OHO00572

INVESTIGATOR: Larson, DW Tel (614) 422-6731

SPONSORING AGENCY: Department of Agriculture, Cooperative State Re-



search Service, CSRS OHO

STATUS: Active NOTICE DATE: Aug. 1980 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.

#### 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

Projected Quantities of Grain Production and Grain Requiring Transp Service in Montana 1984-1985, 1989-1990 & 1999-2000, Koo, WW; Cox, L, Montana Agricultural Experiment Station, Res Rpt. 132

Rail Based Grain Distribution System in Montana Koo, WW; Cox, L, Montana Agricultural Experiment Station, Bulletin 707

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB00077

INVESTIGATOR: Koo, WW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MONB

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service

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. A manuscript was completed analyzing the operations of the Canadian grain marketing system. The study describes Canadian marketing institutions and trade policies. The study also makes a comparative analysis of the Manitoba and the North Dakota grain handling systems. Work was initiated on an evaluation of forward pricing strategies for wheat and sunflowers. This analysis evaluates historic basis relationships and evaluates various hedging scenarios over time. A follow-up study of Canadian trade policies and bilateral trade flows between Canada and the U.S. was initiated. The study will develop historic trade flow data and relate the flows to specific economic

policies in each country.

#### 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: Feb. 1980 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0060238)

20 185240

## THE INFLUENCE OF COAL TRANSPORTATION COSTS ON THE OPTIMAL DISTRIBUTION OF COAL AND THE OPTIMAL LOCATION OF ELECTRIC POWER GENERATING PLANTS

The project is a theoretical and empirical investigation of the impact of space on the movement of coal. Market area analysis will be the first step, to be followed by the adjustment due to structural changes and the locational impact of power generating plants. The final step will be to determine current and future optimal utilization and distribution of coal among regions.

#### REFERENCES:

Influence of Coal Transportation Costs on the Optimal Distrib of Coal & Optimal Location of Electric Power Plants, West Virginia University, DOT/RSPA/DPB-50/79/36, Oct. 1979

PERFORMING AGENCY: West Virginia University

INVESTIGATOR: Campbell, TC Tel (304) 293-5531 Hwang, MJ

SPONSORING AGENCY: Department of Transportation, Research and Special Programs Administration

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

STATUS: Active NOTICE DATE: Sept. 1980 START DATE: Sept. 1978 COMPLETION DATE: 1981 TOTAL FUNDS: \$40,000

ACKNOWLEDGMENT: West Virginia University

20 188659

## IMPACTS OF CHANGES TO TRUCK SIZE, CONFIGURATION AND WEIGHT LIMITS

This project provides an assessment of the freight market and energy impacts of increased truck size and weight limits. Impacts on competition among highway, rail and water carriers are estimated in terms of traffic diversion as a result of changing state limits, prohibiting multiple trailer operations or having weight limits below current federal allowable levels. Estimates of changes in revenues and profitability of carrier groups as well as freight rates are also under study.

A series of 6 reports will be published by TSC between March and July 1981.

PERFORMING AGENCY: Transportation Systems Center, OP-040

INVESTIGATOR: Maio, DJ Tel (617) 494-2258

SPONSORING AGENCY: Office of Policy and International Affairs, Intermodal Studies Division

RESPONSIBLE INDIVIDUAL: Swerdloff, CN

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June 1978 COMPLETION DATE: Oct. 1981

ACKNOWLEDGMENT: DOT



20 193279

**STATEWIDE FREIGHT DEMAND FORECASTING PROCEDURES**

Evaluate alternative procedures for forecasting freight transportation demand, with emphasis on statewide transportation planning. Recommend set of technical approaches for possible development at a future date.

PERFORMING AGENCY: Cambridge Systematics, Incorporated  
 INVESTIGATOR: Nason, S Tel (617) 354-0167 Roberts, PO  
 SPONSORING AGENCY: American Assn of State Hwy and Transp Officials;  
 Federal Highway Administration  
 RESPONSIBLE INDIVIDUAL: Spicher, R Tel (202) 389-6741

Contract NCHRP HR 20-17

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Apr. 1979  
 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$74,365

ACKNOWLEDGMENT: Cambridge Systematics, Incorporated, National Cooperative Highway Research Program

20 315153

**WATER TRANSPORTATION ECONOMICS, NAVIGATION PLANNING EVALUATION, COMMODITY FLOWS (ABBREV)**

OBJECTIVE: To develop techniques and data input for an Analytical System for the nation and regions to aid in the planning and evaluating of alternatives in water transportation. The techniques and input data would be used by Corps offices in preparing survey reports, reconnaissance reports, design memoranda or other investigations related to U. S. waterways and harbors including the Inland Navigation Analysis (INSA) Program in OCE. This work unit will undertake a study to develop a methodology and projections of U. S. domestic and foreign waterborne grain traffic for the inland waterways, Great Lakes and coastal ports of the U. S. Grain included are corn, wheat, soybeans, grain sorghum, barley, rye, and rice. The level of geographic detail for the projections will be sufficient for adaptation for use in survey reports. The required site specific information for the survey report will be applied by Corps field offices to the results of this work unit to obtain the required grain projection. APPROACH: The research to develop grain projections will build upon the interagency and land grant college commodity flow survey for calendar year 1977 as part of a previous IWR work unit. The grain projection study will coordinate the scope of work and research effort with OCE, BERH and Corps field offices. Several other federal agencies such as the Department of Agriculture and the St. Lawrence Seaway Development Corporation will be consulted for input. The study will be undertaken by contract with selected state universities and/or appropriate private contractors. The output will be a grain projection methodology, projected grain waterborne commerce in a technical report, computer tapes and a draft ER.

PERFORMING AGENCY: Army Corps of Engineers, Engineer Institute for Water Resources  
 INVESTIGATOR: Olson, HE Antle, G  
 SPONSORING AGENCY: Army Corps of Engineers, Engineer Institute for Water Resources, 31068

STATUS: Active NOTICE DATE: July 1980 START DATE: 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 963)

20 316079

**ENERGY MATERIAL TRANSPORTATION, NOW THROUGH 2000**

The objectives of this project are to: (1) characterize the present transportation systems for energy materials; (2) project system characteristics through the year 2000; (3) identify possible problems that could occur in energy material transportation; and (4) suggest actions that could be taken to prevent their occurrence. Such identification of potential problems well in advance of their occurrence will serve to reduce the number and severity of potential crises. The project will include literature searches, workshops, discussions with key personnel in energy and transportation, and analysis of the information obtained.

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs  
 INVESTIGATOR: Desteese, JG  
 SPONSORING AGENCY: Department of Energy, Division of Environmental Control Technology, 800032 EY-76-C-06-1830

Contract

STATUS: Active NOTICE DATE: June 1980 START DATE: Oct. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 404)

20 319910

**GREAT LAKES INTERNATIONAL TRADE-HINTERLAND SERVED AND SHIPPERS' ROUTE OPTIONS**

OBJECTIVES: To provide information that will promote knowledgeable decision-making on both the planning and operational levels among those responsible for the future of Great Lakes ports. Specifically: 1. To compile origin/destination (O/D) information for the international movement of goods through Great Lakes ports and for international movements to and from the Great Lakes' 19-state hinterland (using tapes from the Bureau of Census Survey of Domestic and International Transportation of U.S. Foreign Trade). 2. To develop and calibrate a model of shipper choice for cargo routing of overseas trade. 3. To use information obtained to identify any significant strengths and weaknesses of Great Lakes ports in terms of shipment characteristics and their impacts. ANTICIPATED BENEFITS: This information will be of immediate benefit to Great Lakes port managers and to port, local, state and regional planners. Recent technological changes have had dramatic consequences for many Great Lakes ports. Managers are faced with major decisions regarding the ports' futures and have little information upon which to base those decisions. Commodity flow data, O/D analyses and hinterland definitions developed under this project should help them. This information will also be of use and interest to the shipping industry. IDENTIFIED BENEFITS TO DATE: A rudimentary model of shipper choice for routing of overseas cargo has been developed and calibrated using 1970 public use tapes. Investigators are awaiting the Bureau of Census' release of 1976 public use tapes to begin their O/D commodity flow analyses. The investigator has also reviewed the Census Bureau's "Domestic and International Transportation of U.S. Foreign Trade: 1976-Preliminary Report."

PERFORMING AGENCY: Wisconsin University, Milwaukee, School of Business Administration

INVESTIGATOR: Schenker, E Heilmann, R

SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Program Office, R/PS-25

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Sept. 1978  
 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$26,671

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GBP 3879 1)

20 319911

**MATHEMATICAL PROGRAMMING MODELS FOR PROJECTING CARGO MOVEMENTS VIA SNAKE-COLUMBIA RIVER PORTS**

OBJECTIVES: Develop mathematical programming models to delineate the areas in Oregon, Washington, and Idaho from which commodities may be transported on the Columbia-Snake navigation system. Then the models will be applied to evaluate the effects of rate changes and changing supply demand conditions of the commodities on future cargo flow through the ports of the system. The first year's objective, will be to establish a linear programming algorithm for the computer system at the University of Idaho, and gather data for the study. The second year's objective is to apply the transportation models to evaluate the effects of rate changes and changing supply-demand conditions of the commodities on future cargo flows on the Snake-Columbia River ports. ANTICIPATED BENEFITS: The results of the projections from the models will be published and circulated to port, shipper, and carrier parties and other parties interested in cargo forecasts for the Snake-Columbia navigational system. The projections will also be incorporated into the benefit component of a benefit/cost framework within which the University of Idaho projections would be incorporated. Ports in particular will benefit from these studies in that cargo projections are useful for investment planning purposes. Moreover, the linear programming transportation model will enable port personnel to better determine their effective hinterland area and thereby aid their market identification efforts. IDENTIFIED BENEFITS TO DATE: Data have been collected from secondary sources for different kinds of potato products, peas, lentils, and cowhides. The data set includes shipping rates and amounts shipped from origin to shipment destination. Mathematical transportation models and transshipment models have been formulated and tested in actual situations. Goal programming models also have been developed to supplement the transshipment models to account for time lost in transit. Minimum cost routes found by the transshipment models may actually take more time in transit-because of layovers in certain ports. Work is underway using network



analysis such as the critical path method with respect of the time problem. However, no definite results have been obtained.

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics

INVESTIGATOR: Lindeborg, KH Jones, JR

SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Program Office, R/UI-4

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: 1978 COMPLETION DATE: June 1980 TOTAL FUNDS: \$23,800

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GBP 3898 1)

## 20 319912

### IMPROVING TRANSPORTATION OF MARITIME COMMERCE ON THE COLUMBIA-SNAKE SYSTEM

OBJECTIVES: Transportation on the Columbia-Snake rivers system affects the economic development and stability of a major portion of a three state area. Use of the rivers system will increase as new transportation systems are developed, and as fuel costs and availability force business and industry shift to more economical transportation systems. The potential bottleneck to this expected growth is the undersized lock at Bonneville Dam. In this study we will: 1) review the history of shipping on the Columbia; 2) develop a time-cost-delay-model for barge traffic on the river; 3) identify cost savings of enlarging the locks; and 4) identify the level of traffic that would generate economic feasibility (B/C ration greater than one) for enlarging the lock; 5) review cargo projections in conjunction with the University of Idaho programming model; and combine the University of Idaho's projection model with the feasibility levels obtained by this investigation to specify the feasibility and accompanying distributional impacts of modification of the locks. ANTICIPATED BENEFITS: The potential for economic growth in the Columbia-Snake region depends, in large part, upon the locks at Bonneville. Growth in transportation on the river may be constrained by these undersized locks. Yet modifications would be expensive. This study will help policy makers decide if and when (what volume of traffic) such modifications will be economically feasible. The project will encourage a regional research effort by two universities in the area. The expertise and training accomplished in the study will bring greater aid to the firms and agencies engaged in regional maritime transportation. IDENTIFIED BENEFITS TO DATE: (1) Cost estimates for enlarging the locks at Bonneville were obtained from the Corps of Engineers, and are being adapted and refined. (2) Traffic projections for the Columbia River are being statistically estimated. (3) Rail and other transportation rates are being obtained.

PERFORMING AGENCY: Washington State University, Department of Agricultural Economics

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: National Oceanic and Atmospheric Administration, Sea Grant Program Office, R/WSU-2

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: 1978 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$12,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GBP 3900 1)

## 20 325448

### DEVELOPMENT OF A MODEL FORECASTING COAL TRANSPORTATION CAPABILITY

DESCRIPTION: The demand for coal is expected to rise substantially as more and more coal burning plants are constructed and existing oil-and gas-fired plants are converted to burn coal. A large portion of the coal needed to meet this demand will have to come from the western states, such as Montana, Wyoming, the Dakotas, and Utah. Planners and policy makers do not generally see any obstacles in the extraction and utilization of this western coal except that, at the stage of transportation, capability may not be adequate and additional capability-both rail and slurry pipe line-may be required to meet the increased transportation demand. This continuing research project involves the development of a coal transportation model that will determine capacity requirements and shipments, undersupply, regulatory, and environmental constraints of coal utilization. Mathematical programming techniques will be used to conduct the analysis.

PERFORMING AGENCY: Texas University, Austin, Department of Electrical Engineering

INVESTIGATOR: Baughman, ML Vadie, H

SPONSORING AGENCY: Texas University, Austin

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: 1978

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (NTX 982 1)

## 20 329574

### APPLICATION OF STATEWIDE FREIGHT DEMAND FORECASTING TECHNIQUES

The objective of Phase II is to demonstrate the applicability of a freight demand forecasting technique for direct use by state agencies. The technique must, at a minimum, develop freight flows by highway, rail, and water for the current year; forecast the likely annual freight volumes and shifts among the modes over the short term (5 years or less); and provide origins and destinations by commodity within a corridor or region at the sub-state, state, or multi-state level. The technique must use generally available data and methods, with modification if necessary, to facilitate application to specific problems (e.g., deregulation and rate changes). Extensive development work is not envisioned. The required end-product is a usable freight forecasting technique documented in a self-contained user's manual for general application at the state level.

See also Phase I, RRIS 20A, 193279. Performing organization to be awarded.

SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Spicher, R Tel (202) 389-6741

NCHRP HR 20-17

STATUS: Proposed NOTICE DATE: Feb. 1981 TOTAL FUNDS: \$175,000

ACKNOWLEDGMENT: National Cooperative Highway Research Program

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) 426-6277

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1976 COMPLETION DATE: Mar. 1981 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. Beginning in January of 1981, the Houston project will be administered through the auspices of the Houston Belt and Terminal Railroad.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

INVESTIGATOR: Joiner, D Tel (713)224-3662 Anderson, 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) 426-6277

Contract DOT-FR-75244 (CC)

STATUS: Active NOTICE DATE: Feb. 1981 - START DATE: Aug. 1977 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-DEMONSTRATION PROGRAM**

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 established six task forces to address and overcome those critical facets of the freight car

utilization problems identified in Phase I. The task forces structured case studies, research and demonstration programs which facilitate the adoption of improvements throughout the industry. Current FCUP work is focused on promotion and implementation of five of these areas--management integration, car cycle analysis, service planning, interroad car management, and mechanical bad order time.

**REFERENCES:**

Catalog of Freight Car Utilization Projects and Publications, 26p, July 1980

FCUP Publications Listing 8p, Nov. 1980, available from FCUP

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Muchlke, RV

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280 Taylor, CE Tel (202) 293-4084

CONTRACT DOT-FR-53-80-C-50005

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Aug. 1981 TOTAL FUNDS: \$647,765

ACKNOWLEDGMENT: AAR

21 159626

**FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM UTILIZATION AND SERVICE RELIABILITY IMPACTS OF OPERATING PLANS**

The Program will work with its subcontractor, Massachusetts Institute of Technology, to complete documentation on the MIT service planning model, and to assist any large railroad to apply this model on its own properties as part of a larger planning process which leads to the development of an improved operation/service plan, helps integrate the activities of operating and marketing departments and demonstrates to the industry as a whole the feasibility and utility of service planning. The program will also work to install the terminal control and budgeting system on B&M. It will test the dynamic class track assignment system on SP.

Fourteen reports issued by November 1980.

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Muehlke, RV

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-53-80-C-50005

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: AAR

21 159627

**FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM. CAR CYCLE ANALYSIS**

This program will continue to work with its subcontractor, SRI International, to modify the Car Cycle Analysis System processing logic, output formats and other characteristics to increase the system's accuracy and usefulness. It will process data on specific car types, primarily at the AAR with AAR personnel, but some processing may be done at SRI, particularly on car types on which SRI has already performed work. These and other analyses will be used to identify problems--particularly in empty car time, terminal time and customer time.

**REFERENCES:**

The Car Cycle Analysis System Car Cycle Analysis Subcommittee, AAR R-442 61p, Sept. 1980

PERFORMING AGENCY: Association of American Railroads

INVESTIGATOR: French, PW Tel (202) 293-4165 Warfield, TP

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 472-7280 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July 1977 COMPLETION DATE: Aug. 1981 TOTAL FUNDS: \$60,000

ACKNOWLEDGMENT: AAR



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

RESPONSIBLE INDIVIDUAL: Edson, WD Tel (202) 472-1014

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: 1977  
COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$1,300,000

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: Cracker, WF, Jr Tel (202) 426-0855

Contract DOT-TSC-1337

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Apr. 1977 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$430,000

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) 426-6277

Contract 75232

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1976 COMPLETION DATE: Mar. 1981 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: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

21 185236

## FREIGHT CAR UTILIZATION STUDY

The major effort has been to design, implement and evaluate an operating/service plan on the Boston & Maine. Major service changes implemented in the Spring of 1979 have improved service and profitability and will be monitored through 1980. The planning process and procedures for inter-departmental coordination will be documented. The next step will be to transfer the process to a larger railroad. Additional projects include a study of the relationship between power and car utilization and a test of new terminal control techniques at Southern Railway's Macon Yard.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM Tel (617) 253-5326 Martland, CD

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Wooden, DG Tel (202) 293-4165

STATUS: Completed NOTICE DATE: Aug. 1979 START DATE: July 1977 COMPLETION DATE: July 1980 TOTAL FUNDS: \$500,000

ACKNOWLEDGMENT: Massachusetts Institute of Technology

21 185237

## USRA CAR UTILIZATION STUDY

A detailed study of existing car distribution practices, procedures and organizational relationships on Conrail will be performed and comparison between Conrail and other major US railroads will be documented. Potential changes to the car distribution system will be developed; specific changes to organization, information systems and analysis procedures will be based upon a determination of those areas which offer the most potential for improvement.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM Philip, CE

SPONSORING AGENCY: United States Railway Association

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Jan. 1980 TOTAL FUNDS: \$24,863

ACKNOWLEDGMENT: Massachusetts Institute of Technology

21 185238

## UNION PACIFIC CAR DISTRIBUTION STUDY

A detailed study of existing car distribution practices, procedures and organization relationships on Union Pacific will be performed and comparison between UP and other major U.S. railroads will be documented. Possible changes to the car distribution system will be identified and a decision support system will be designed and implemented.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM Philip, CE

SPONSORING AGENCY: Union Pacific Railroad

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$21,000

ACKNOWLEDGMENT: Massachusetts Institute of Technology

21 188662

## BUFFALO TERMINAL PROJECT

The purpose is to test the labor management concept on Conrail. The objective is being achieved through a series of experiments involving changes in operating practices, labor agreements, rates, and regulations.

PERFORMING AGENCY: Conrail, Labor-Management Task Force  
 INVESTIGATOR: Bethge, C Tel (716) 847-4272 Morey, J  
 SPONSORING AGENCY: Federal Railroad Administration; New York State  
 Department of Transportation; Conrail, Labor-Management Task Force  
 RESPONSIBLE INDIVIDUAL: Kozak, DJ Tel (202) 426-6277

CONTRACT DOT-FR-8186

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: July  
 1978 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: FRA

#### 21 196725

##### EFFECT OF FOUR ASPECT RAILWAY SIGNAL SYSTEM

To examine the effect on a typical Canadian railway subdivision of a 4th aspect signal ("slow-clear") on a) the timetabling of trains b) the need for heavy capital expenditure on double tracking. Gather information on an international (European) basis; develop a computer model of a railway timetable for a defined section; compare train capacity versus length of sidings for 3-aspect and 4-aspect signal systems. The goal is increased traffic capacity on a single line track and deferment of complete double-tracking through the management of trains in lieu of capital expenditures.

PERFORMING AGENCY: Manitoba University, Canada, U18S13030

INVESTIGATOR: Landsdown, A

SPONSORING AGENCY: Manitoba University, Canada

STATUS: Active NOTICE DATE: July 1979 START DATE: Oct.  
 1977 COMPLETION DATE: Oct. 1979

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 21 196733

##### FLAT YARD INVESTIGATION

To improve the productivity of operations of flat classification yards on the CN System by the application of process control using mini-computer technology to identify locations of all cars within a typical flat classification yard.

PERFORMING AGENCY: Canadian National Railways, 111C13813

INVESTIGATOR: Rennie, R

SPONSORING AGENCY: Canadian National Railways

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: June  
 1978 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 21 196734

##### PROGRESSION OF COMPUTERIZED INVENTORY SYSTEM MONTREAL YARD

To improve the productivity of major classification rail yard in Montreal the application of process control using mini-computer technology will identify locations of all cars within the yard terminal areas. Technology will be adaptable to all other similar installations on CN's system.

PERFORMING AGENCY: Canadian National Railways, 111C13810

INVESTIGATOR: Rennie, R

SPONSORING AGENCY: Canadian National Railways

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: June  
 1978 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 21 196742

##### CHICAGO INTERMODAL TERMINAL ROADWAY PROJECT

Feasibility study of a truck roadway, on railroad right-of-way, grade separated, connecting major Chicago intermodal terminals, providing low cost trailer interchange between the railroads involved.

PERFORMING AGENCY: Barton-Aschman Associates, Incorporated; Kearney (AT) and Company, Incorporated; Murphy Engineering Incorporated; Ripley Mead

INVESTIGATOR: Powells, M Tel (312) 491-1000 Davidson, W Hartigan, M

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Brooks, WR Tel (202) 472-1014

Contract DOT-FR-8156

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Sept.  
 1978 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: \$250,000

#### 21 319078

##### PORTLAND TERMINAL PROJECT

The purpose is to establish a cooperative labor-management experimental project in the Portland railroad terminal. The objective of the program is to experiment with innovative operating practices that will facilitate the movement of cars through the terminal. The scope of these experiments include labor work rules, management practices, and government regulations. Part of the project involves use of a computer system to monitor movement of cars and to measure factors that determine car speed and reliability.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

INVESTIGATOR: Currier, W Hudson, J

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 426-6277

Contract DOT-FR-9045

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Feb.  
 1979 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: \$900,000

ACKNOWLEDGMENT: FRA

#### 21 319909

##### IMPACT OF CHANGES IN WAGE RATES AND BENEFITS ON GRAIN FREIGHT RATES

OBJECTIVE: Identify marginal relationships between changes in various components of operating costs of railroads and changes in freight rates of transporting grain by railroads. Emphasis of the study will center around specifying the relationship between marginal labor costs and marginal review (freight rates) of railroads, with respect to grain transported. APPROACH: Operating Revenues and Expenses, Operating Statistics of Large Railroads, Commodity Statistics and Wage Statistics in Class I Railroads in the U.S. are sources of data to which a multiple regression study will be fit to achieve the objective.

PERFORMING AGENCY: Kansas State University, College of Business Administration

INVESTIGATOR: Winkler, AL

SPONSORING AGENCY: Kansas State Government, 0078253 KAN00008

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: July  
 1978 COMPLETION DATE: May 1989

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GY 78253)

#### 21 323371

##### RAIL FREIGHT TRANSPORT PLANNING IN CANADA

In this research project routing and scheduling operations of freight trains are studied. This study is conducted for a major railway company with the objective of upgrading service quality—that is, reliability and travel time at the lowest possible cost. An optimization model is proposed to simulate various operating strategies. This model will supplement Canadian National's collection of simulation tools.

PERFORMING AGENCY: Montreal University, Canada, Center for Research on Transports, Q010UE

SPONSORING AGENCY: Montreal University, Canada, Center for Research on Transports

RESPONSIBLE INDIVIDUAL: Ferland, JA

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: June  
 1979 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

#### 21 323380

##### STRATEGIES FOR IMPROVING RAIL CAR DISTRIBUTION: A STUDY IN OVERCOMING ORGANIZATIONAL AND INSTITUTIONAL BARRIERS TO INNOVATION

The project assesses the readiness of the railroad industry to accept change in the car distribution process, and its capability for implementing that change. Innovations will be examined in terms of the organizational and institutional aspects their implementation might affect, and the payoffs that might be realized by their implementation. Those innovations which are found to be most feasible and beneficial will be examined in more detail, and strategies for their implementation will be developed.

## Freight Operations

21A

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM Meyer, M

SPONSORING AGENCY: Massachusetts Institute of Technology

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1980 COM-  
PLETION DATE: June 1981

ACKNOWLEDGMENT: Massachusetts Institute of Technology

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. A survey of grain elevators, feed processors, corn millers, soybean processing plants and wheat millers was made in Indiana in 1978 as part of the regional project. Data were collected by personal interview and are currently being processed. Usable survey forms were obtained from over 140 firms representing more than 25% of storage or processing capacity in the state. Data were collected on receiving, shipping, storage and grain handling capacity for each firm. Data were obtained on receipts and shipments of grain by month, by type of grain, by origin and destination and by mode of transport. The data on grain flows will be combined with similar data collected by other states and will represent data not available from any other source. The data will be used in models designed to evaluate the efficiency of the grain marketing and transportation system which serves both domestic and foreign buyers. Summaries of the data will be published to meet frequent requests for data on grain shipments from Indiana. These data should be useful to firms which are considering location of new grain handling firms, and to persons responsible for making decisions about the transportation system for marketing Indiana grain.

**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: Feb. 1980 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Purdue University (CRIS 0060205)

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.

**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, RL; Goff, JW, Michigan State University, School of Packaging, Technical Report 24, Aug. 1976

Investigation of the Material Properties of Corrugated Paperboard, Chatman, RL, Michigan State University, School of Packaging, Suppl to Special Rpt. 9, 69 p., 1977

Moisture Protection Performance for Packages for Non-Fat Dry Milk, Chatman, RL; Goff, JW; Gyeszly, SW, Michigan State University, School of Packaging, 3 p., 1977

Environmental Evaluation of Bags for Non-Fat Dry Milk Chatman, RL; Goff, JW, Michigan State University, School of Packaging, 51 p., 1977

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. 1980 START DATE: Aug. 1971 COMPLETION DATE: July 1999

ACKNOWLEDGMENT: Michigan State University, East Lansing (CRIS 0060632)

22 138375

**REDUCING LOSSES FROM PHYSICAL INJURY TO FRUITS & VEGETABLES DURING PACKAGING, HANDLING, & TRANSPORT**

Determine the extent and cause of physical injuries to fresh fruits and vegetables packaging, handling, and transport; to reduce such losses by improved methods of packaging, handling, and transport of these commodities. Measure losses from physical damage to fruits and vegetables at various stages of harvesting, packing, loading, transport and distribution of these products to consumers. Develop improved handling techniques, new packages, and improved methods of transportation to reduce such losses and improve the quality of food available to consumers. Standardized sizes of packages will be studied for effects on loss reduction and for increased efficiency and consequent savings in food costs.

**REFERENCES:**

Lettuce Temperatures in a Van Container with a Reverse Airflow Circulation, Hinsch, RT; Hinds, RH; Goddard, WR, Proceedings (27th) pp 130-33, 1975

Performance of 35-pound Fiberboard Boxes Jumble-Packed with Peaches and Nectarines, Rij, RE, Mktg. Res. Rpt. 1077, 7 p., 1977

Compatibility of Fruits and Vegetables during Transit in Mixed Loads, Lipton, WJ; Harvey, JM, Mktg. Res. Rpt. 1070, 7 p., 1977

PERFORMING AGENCY: Agricultural Research Service, Department of Agriculture, 5202-20580-003

INVESTIGATOR: Hinsch, RT Rij, RE Lipton, WJ

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1969 COMPLETION DATE: Oct. 1984

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.

**REFERENCES:**

75 Corn Crop Uncertain Bateman, WL, Farmers and Consumers Market Bulletin, Vol. 61 No. 4, Jan. 1975

Threat Posed by Soybeans from Brazil Huang, CL; Anderson, RF, Southeast Farm Press, Vol. 4 No. 2, p 48, 1977

PERFORMING AGENCY: Georgia Agricultural Experiment Station, Agricultural Economics Department, GEO01185

INVESTIGATOR: Anderson, RF

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service



STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1974 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0065175)

## 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.

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: June 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070435)

## 22 153703

**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. 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.

### REFERENCES:

Volume of Grain and Fertilizer Requiring Transportation: Projections to 1984-1985 and 1989-1990 by Counties in Iowa, Miller, JJ; Baumel, CP; Wisner, RN; Fenton, TE, Iowa State Univ, Department of Economics, Unpublished

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. 1980 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.

### REFERENCES:

Rail Line Abandonment in the North Central Region Sorenson, LO; Anderson, DG; Johnson, MA, Kansas Experiment Station, Bulletin 627 Pub No. 249, Feb. 1979

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: June 1980 START DATE: Oct. 1961

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070301)

## 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. 1980 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.

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. 1980 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.

Additional Report: An Economic Analysis of Optimal Grain Market Structures and Grainflow Patterns with Selected Policy and Technological Changes in the Northeast, South, and Delta areas within Mississippi, Ph. D. dissertation, 1978 by A. J. Allen.

#### REFERENCES:

A River Terminal Elevator at Amory, MS-Feasibility Analysis Stennis, EA; Bateman, WL; Phillips, TD; Bufkin, TS, Mississippi State Univ, Department of Agricultural Economics, Spec Rpt. 4, 1978

On-Farm Soybean Experiment Station Adeyemo, R; Malone, GW; Phillips, TD; Couvillion, WC, Mississippi State, 1977

Improving Cooperative Marketing of Mississippi Delta Soybeans, Thurston, SK, Economics, Statistics and Cooperatives Service, USDA, SVC Rpt. 147, 1978

PERFORMING AGENCY: Mississippi State University, Department of Agricultural Economics, MIS-4806

INVESTIGATOR: Phillips, TD Bateman, WL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MIS

STATUS: Active NOTICE DATE: Aug. 1980 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.

#### REFERENCES:

Structure of Grain Marketing in the South Suffett, DM; Hall, HH, Southern Coop Series, Bulletin 215, 1977

The Midwestern and Southern Grain Merchandising Patterns: A Contrast, Baldwin, ED; Bateman, WL, Southern Coop Series, Bulletin 221, 1977

Grain Handling and Processing Firms in Alabama Stallings, JL; Harrison, GL, Agr. Econ Series, Series 21 (Revised), 1977

Soybeans: Problems and Possibilities Stallings, JL; Thurlow, DL, Alabama Agribusiness, Vol. 15 No. 4, 1977

PERFORMING AGENCY: Auburn University, Department of Agricultural Economics and Rural Sociology, ALA00648

INVESTIGATOR: Stallings, JL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS ALA

STATUS: Active NOTICE DATE: Aug. 1980 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 Hall, HH

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS KY

STATUS: Active NOTICE DATE: Aug. 1980 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.

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, CSRS ARK

STATUS: Active NOTICE DATE: Aug. 1980 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.

#### REFERENCES:

Transportation Rates for Corn, Wheat and Soybeans Free, WJ; Stone, LE; Baldwin, D, Tennessee Valley Authority; Southern Coop Regional Series, Ser 227, Bulletin Y-124 127 p., 1978



PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OH000596  
 INVESTIGATOR: Sharp, JW Baldwin, ED  
 SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS OHO

STATUS: Active NOTICE DATE: Aug. 1980 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.

#### REFERENCES:

Comparative Costs of Conditioning and Storing Corn Schwartz, RB; Hill, LD, ILLU, Dept Agric Econ, Agricultural Experiment Station, AERR-152, 32 p., July 1977

Costs of Drying and Storing Shelled Corn, Illinois Farms Schwartz, RB; Hill, LD, ILLU, College of Agriculture, Cooperative Extension Service, Circular 1141, 12 p.

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, ILLU-05-0348

INVESTIGATOR: Hill, LD Brooks, BL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS ILLU

STATUS: Active NOTICE DATE: Aug. 1980 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. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073070)

## 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. 1980 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074775)

## 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.

#### REFERENCES:

Effects of Storage Atmosphere and Relative Humidity on Barley and Malt Characteristics, Storey, CL; Pomeranz, Y; Lai, FS; Standridge, NN, Brewers Digest 52:40-43, 1977

Effect of Controlled Atmosphere on Flavor Stability of Almonds, Guadagni, DG; Soderstrom, EL; Storey, CL, Journal of Food Sciences, 1977

PERFORMING AGENCY: Agricultural Research Service, Grain Marketing Research Center, 3420-20620-006

INVESTIGATOR: Storey, CL Sauer, DB

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: June 1976 COMPLETION DATE: Nov. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043120)

## 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.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, IOW02177

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IOW

Contract 616-15-86

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1976 COMPLETION DATE: Mar. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070487)

## 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 effect of alternative inventory policies on the size and variability of world grain surplus or deficits. A mathematical programming model was developed to minimize the cost of shipping Montana wheat and barley to domestic and export markets. The movement patterns of wheat and barley are sensitive to transportation rates. Price elasticities of demand for truck and rail transportation are high. For a 5% increase in rail rates over existing rates, *ceteris paribus*, the quantities of grain shipped by rail are reduced 40%. Also cross elasticities are large. For a 5% increase in truck rates, *ceteris paribus*, the increase in quantity of grain hauled by rail increases 38%. TCK smut wheat produced in parts of Montana are excluded from the P.R. China market. A feasibility study was completed to analyze the possibility of preserving the identity of non-contaminated wheat throughout the grain marketing system. The short run costs of an identity preserved system amount to about 1.2 cents per bushel while the benefits amount to about 2.8 cents per bushel. However, the longer run feasibility of such a program is questionable. The major research effort next year will be in developing a model of the entire U.S. wheat export system.

#### REFERENCES:

Shipment Patterns of Montana Wheat and Barley Under Alternative Rail and Truck-Barge Rate Structures, Koo, WW; Cramer, GL, Montana Agricultural Experiment Station, Bulletin 696, Mar. 1977

An Economic Analysis of Marketing Montana TCK Smut Free Wheat in the People's Republic of China, Cramer, GL; Murphy, ME; Mathre, DE, Montana Agricultural Experiment Station, Bulletin 699, Feb. 1978

Competition Between Truck-Barge and Rail Transportation in Rate Sensitive Areas, Koo, WW; Cramer, GL, Transportation Perspectives, Fall, 1977

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: July 1979 START DATE: Nov. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071923)

## 22 179694

### ECONOMIC ANALYSES OF THE UNITED STATES 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 differ-

tials, 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, improve forecasts of U.S. grain production, supply equations

#### REFERENCES:

Feed Grain Imports and Their Effect on Feed Grain Prices in the Importing Country, Reed, M, Iowa State University, Ames, Ph. D. Thesis, 1978

Use of Subjective Data in Estimating Farm Supply Response Kingtong, Y, Iowa State University, Ames, Ph. D. Thesis, 1978

The Effect of Corn Quality on Ration Costs Miller, DR, Iowa State University, Ames, MS Thesis, 1978

Use of Planting Intentions to Predict Actual Plantings Ladd, GW; Kingtong, Y, Iowa State University, Ames, Dept of Economics, Staff Paper 86, 1978

Relation of Corn Grades to Feed Quality Ladd, GW; Miller, D, Iowa State University, Ames, Dept of Economics, Staff Paper 87

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, IOW02196

INVESTIGATOR: Ladd, GW Kaldor, DR Paulsen, A

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IOW

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071725)

## 22 179695

### ECONOMIC ANALYSES OF THE UNITED STATES 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 Linsenmeyer, D

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS NEB

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071857)

## 22 179696

### ECONOMIC ANALYSES OF THE UNITED STATES 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 at the producer level. Use existing spatial equilibrium models to identify least cost routings from origin to port.

#### REFERENCES:

Grain Facilities in the U.S. Specializing in Originating Grain for Export and Soybean Processing Plants, Sharp, JW, OSU, Department of Agricul-



tural Economics & Rural Sociology, OARDC Research Circular, Dec. 1977

PERFORMING AGENCY: Ohio Agricultural R and D Center, Department of Agricultural Economics and Rural Sociology, OHO000597

INVESTIGATOR: Sharp, JW Walker, FE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS OHO

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071808)

## 22 179697

### ECONOMIC ANALYSES OF THE UNITED STATES 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: Aug. 1980 START DATE: July 1977 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073046)

## 22 179698

### ECONOMIC ANALYSES OF THE UNITED STATES GRAIN EXPORTING SYSTEMS

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.

#### REFERENCES:

The Nonmarket Economies Balance of Payments: Implications for U.S. Agricultural Exports, Jones, JR, Research Paper No. 7659

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics, IDA00725

INVESTIGATOR: Jones, JR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IDA

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071187)

## 22 195927

### IMPROVING REFRIGERATED TRANSPORTATION OF FRESH MEATS

Improve the efficiency of transporting fresh meats from packinghouses to consignee using refrigerated trailers. Studies designed to evaluate and improve the present handling procedures and equipment performance will be conducted to determine where significant improvements can be made in the distribution of fresh meat. Equipment cleaning and pretripping maintenance practices will be thoroughly reviewed to provide information where improvements in the present distribution systems need to be made, then a series of recommended procedures will be developed. Handling techniques

will also be reviewed and improved. Suggestions for improvement will be applied to actual meat shipments and evaluated by a team of researchers and industry representatives. Cooperation with APHIS, Association of American Railroads, individual railroad companies, refrigeration equipment companies, and other Government Agencies will be encouraged.

#### REFERENCES:

Commodity Requirements and Recommendations for Transport and Storage-Fresh Meats, Hoke, KE, 2nd Nat Controlled Atmos Res Conf, Mich State Univ, Proceeding Paper, pp 300-301, 1977

Effects of Modified Atmospheres on Meat During Storage and Long-Distance Transit, Hoke, KE, 2nd Nat Controlled Atmos Res Conf, Mich State Univ, Proceeding Paper, pp 294-299, 1977

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory

INVESTIGATOR: Hoke, KE

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Nov. 1974

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041945)

## 22 195928

### APPLICATION OF INSECTICIDES INTO TRANSPORTATION FACILITIES TO PREVENT INSECT DAMAGE TO FOOD AND FEED

Evaluate and develop methodology for the effective use of insecticides as residual-type sprays, space treatments, and fumigation of transportation facilities such as rail cars, aircraft, truck vans, and river, lake, and ocean vessels. By using laboratory test chambers and test commodity shipments in various vehicles in cooperation with U.S. agribusiness, USDA, and other Government Action Agencies, insecticides will be evaluated as to efficacy of various application techniques. Major emphasis will be upon residues, space treatments, and fumigants. Application techniques will also be evaluated for potential hazard to persons applying the pesticide, commodity handlers within the market channels, and the consumer. Pesticide residues, bioassays, and vapor and fumigants concentrations will be monitored during testing. Specific approaches will be dependent upon commodity, packaging construction (if any), vehicle type and its construction, and length of the marketing channel involved.

#### REFERENCES:

An In-Transit Shipboard Fumigation of Corn Leesch, JG et al, Journal of Economic Entomology, 71:928-35, 1978

PERFORMING AGENCY: Agricultural Research Service, Stored Products and Insects

INVESTIGATOR: Gillenwater, HB Zettler, JL Leesch, JG

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1983

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0044430)

## 22 196119

### CHARACTERISTICS OF U.S. GRAIN PORTS FOR MAXIMUM MARKETING/TRANSPORTATION EFFICIENCY

Determine the time and cost performance of U.S. grain ports under alternative stochastic conditions and evaluate how port performance is affected by altering port elevator numbers and capacities. Determine those grain port locations which maximize the export grain marketing/transportation system's efficiency and evaluate the sensitivity of a port's efficiency, advantage or disadvantage to transportation policies. Involves implicit coupling of a linear programming interregional crop competition model and a stochastic simulation model representative of ports and their operations.

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics, TEX06365

INVESTIGATOR: Fuller, SW Harston, C Cook, ML

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS TEX

Contract 801-15-40

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0076604)

22 196120

**CORN QUALITY DURING HANDLING AND TRANSPORTING AS AFFECTED BY MOLD DEVELOPMENT**

Determine: Mold deterioration of corn and conditions of transport from the midwest to SE and S U.S. Determine effects of environment, BCFM, and storage and drying history on storability; develop recommendations for managing corn during storage, handling and transportation. Corn samples will be collected prior to and after shipment by train, truck or barge from the midwest to SE and S U.S. with environment monitored in shipment. Samples will be evaluated for molds, damage, mycotoxins and other quality criteria. Corn will be stored at harvest moistures and constant temperatures and monitored for mold and mycotoxin activity. Portions will be further stored at environmental conditions simulating transport to SE and E U.S. Models will be developed employing data from storage tests and weather records that will predict storability as affected by relevant variables.

PERFORMING AGENCY: Purdue University, Department of Botany and Plant Pathology, IND055016B

INVESTIGATOR: Tuite, J Brook, RC Poster, GH

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IND

Contract 801-15-45

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: May 1978 COMPLETION DATE: May 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0076330)

22 196122

**ALTERNATIVE ADJUSTMENT STRATEGIES TO THE EVOLUTION OF THE TRANSPORTATION SYSTEM**

Determine alternative strategies which can be utilized by the agricultural sector both individually and collectively to adapt to the changes occurring in the transportation sector. Explore causes of the rail car shortage and determine the economic feasibility of various alternatives. Determine the long-term interest of the S.D. grain producer regarding changes in ownership of various rail lines. Consolidate the results of objectives 1 and 2 with abandonment strategies and to provide information to South Dakota transportation users on the alternative courses of action available.

PERFORMING AGENCY: South Dakota State University, Department of Economics, SD00889

INVESTIGATOR: Vollmers, AC

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS SD

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Nov. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0077403)

22 308428

**LIVESTOCK TRANSPORTATION BY RAIL**

Modification of an existing 85-foot double-deck stock car with on-board drinking and feed stations and subsequent test trips of varying lengths will determine if there could be increased shipping of cattle by rail. A major goal is prevention of "shipping fever" in cattle which is caused by the stress of long-distance trips.

PERFORMING AGENCY: Texas Department of Agriculture; Texas A&M University

SPONSORING AGENCY: Department of Agriculture, Office of Transportation

RESPONSIBLE INDIVIDUAL: Bailey, WA

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: 1979 TOTAL FUNDS: \$65,000

22 315156

**DEVELOPMENT OF COATINGS FOR PROTECTION OF COAL DURING TRANSPORT AND STORAGE**

Coal in stockpiles or in rail cars is subject to adverse effects from exposure to wind and rain. The purpose of this program is to evaluate the technical feasibility and economics of coating coal stores to prevent moisture penetration and air circulation. Small stock piles of coal will be coated to test the durability and water permeability of a novel polymeric coal coating. Analysis of the relative degradation in fuel value of coated and uncoated piles will be performed.

PERFORMING AGENCY: Atlantic Research Corporation

INVESTIGATOR: Culp, C Tel (703) 642-4193 Hyde, R

SPONSORING AGENCY: Atlantic Research Corporation

Contract

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Dec. 1980 COMPLETION DATE: Dec. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 817)

22 319084

**OPTIMUM NUMBER, SIZE, AND LOCATION OF COMMERCIAL GRAIN STORAGE FACILITIES IN SOUTH CAROLINA**

Determine the optimum number, size, and location of commercial grain storage facilities in South Carolina. The optimum number, size, and location of commercial grain storage facilities will be considered to be that configuration which minimizes the costs of assembling, storing, and distributing grain in South Carolina. Grains to be included in the analysis include corn, soybeans, barley, oats, wheat, and grain sorghum. Storage costs will be determined by the economic engineering approach. Transportation rates will be gathered from railroads and grain trucking firms. A transshipment-plant location model, using a combinatorial algorithm, will be employed to determine the minimum cost solution.

PERFORMING AGENCY: Clemson University, Department of Agricultural Economics and Rural Sociology, SC00395

INVESTIGATOR: Miller, SE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS SC

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1979 COMPLETION DATE: June 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0079493)

22 319085

**TRANSPORTATION AND LOGISTICAL PROBLEMS ASSOCIATED WITH PULPWOOD MARKETING SYSTEM IN THE SOUTHEAST**

Develop and apply mathematical models to a study of the effects of transportation costs on shipping and storage facilities needed for an economically efficient logistical system to serve Southeastern pulpwood markets. This will be pursued through the following: Estimate transportation costs involved in the pulpwood marketing process, with emphasis on regional pulpwood production and transportation networks. Determine optimum shipping patterns of the Southeastern pulpwood industry. Determine the effects of changes in costs and prices on optimum shipping patterns; the emphasis will be on the impact of expected energy costs and future pulpwood prices. The transportation system will be analyzed by collecting cost data on various transportation methods (truck, rail, etc.) and on final markets. These data will be used in a minimum cost model to determine optimum shipping patterns from woodlot to mill yard. In addition, the spread between market prices and transportation costs would be interpreted in terms of pricing efficiency.

PERFORMING AGENCY: Georgia University, Athens, Department of Agricultural Economics, GEO-03-0595

INVESTIGATOR: Ames, GCW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS GEO

Contract 901-15-109

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: May 1979 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0079378)

22 319086

**ECONOMIC EFFECTS OF TRANSPORTATION POLICY AND REGULATORY CHANGES IN U.S. GRAIN MARKETING SYSTEM**

Determine the effect of general rate changes and alternative rate structures such as seasonal rail rates, unit train rates and barge user charges on the spatial and temporal flows of the grain in the U.S.; analyze the impact of these rate changes on the storage system in producing regions, and evaluate the interaction of the grain storage system with the grain rail car shortage under alternative rate structures; and evaluate the sensitivity of the grain distribution system to alternative grain export policies and interaction of

these export policies with transportation and regulatory changes. This research will be conducted for the continental United States with detailed information in grain transportation activities between producing and consuming regions. The basic approach to be used in this study is spatial equilibrium analysis based on a linear programming model. Most data necessary to complete this study will be given by NC-137 regional transportation and S-115 regional marketing committees.

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB00089

INVESTIGATOR: Koo, WW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MONB

Contract 901-15-108

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: May 1979 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0079377)

## 22 319087

### ECONOMIC ANALYSES OF THE UNITED STATES 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. Describe the marketing techniques and strategies used by exporters in several exporting countries. Evaluate alternative marketing procedures, such as identifying preserved shipments, special contracts, certificate final shipments, FOB, and CIF. Compare grading procedures and other terms of contracts used in world trade. Develop a model to analyze the effects of the alternative techniques on economic incentives and price level for grain at producer level. Develop cost data for different combinations of transportation modes including storage costs, port facilities, and ocean freight. 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. Establish priorities for improving the present grain export marketing system and quantify the benefits of adoption of cost-reducing techniques and market organization.

PERFORMING AGENCY: Oregon State University, Department of Agricultural and Resource Economics, ORE00595

INVESTIGATOR: Martin, MV

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS ORE

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: May 1979 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0079428)

## 22 319088

### IMPACT OF THE TENNESSEE-TOMBIGBEE WATERWAY ON THE TRANSPORTATION-MARKETING SYSTEM

Examine the existing transportation and marketing system for selected products in the Tennessee-Tombigbee area, determine the transportation and marketing facilities needed to move selected agricultural products into and from the region at minimum cost, analyze the adjustments needed to achieve the least cost structure, and determine those changes caused by the Waterway, and develop policy alternatives which stimulate economically efficient development on the Waterway. Information relating to transportation availability, modes and marketing facilities will be obtained by surveys. A spatial equilibrium model will be used to estimate the kind of transportation and marketing system that would efficiently move products from and into the region. The model developed for objective 2 will be used to examine potential shifts in product flows and marketing activities due to opening the Waterway. The model and results obtained in objectives 2 and 3 will be used to estimate the impact that certain policy alternatives might have.

PERFORMING AGENCY: Mississippi State University, Department of Agricultural Economics, MIS-4407

INVESTIGATOR: Allen, AJ

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MIS

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1978 COMPLETION DATE: Sept. 1983

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0076263)

## 22 319089

### RATE STRUCTURE AND REGULATORY BARRIERS AFFECTING TRANSPORTATION OF WISCONSIN LIVESTOCK AND MEAT

Analyze Wisconsin's transportation systems and techniques which may provide cost reduction and improved efficiency for the livestock and meat industry. Evaluate the current interstate rate structure, transportation barriers and regulations, and economic regulation of the intrastate system. Formulate recommendations on restructuring rates, improved efficiency and technology, energy conservation and reducing transportation costs. Research will be designed to identify critical interstate and intrastate rate structure problems and regulatory barriers. Transportation systems used by the Wisconsin livestock and meat industry will be studied statewide. Primary data will be obtained from field and mail surveys from transportation firms, processor and shippers. The current rate structures and Commerce Commission, the State Department of Transportation and major transportation firms operating in the State. Institutional and regulatory barriers will be reviewed, including a comprehensive study of current laws and back haul regulations. Special cost situations will be developed on alternative systems and cost case study models will be used to determine operational costs and margins. Recommendations will be developed for proposed administrative and policy changes to improve the State transportation system.

PERFORMING AGENCY: Wisconsin University, Madison, Department of Meat and Animal Science, WIS02382

INVESTIGATOR: Vilstrup, RH Ward, RJ

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS WIS

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0075556)

## 22 319090

### ECONOMIC ANALYSES 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; competitive advantage; relative efficiency of time, form and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their relationship with commodity futures markets. 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 cost of marketing and transportation; price responsiveness and uncertainty.

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics, TEX03396

INVESTIGATOR: Cook, ML

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS TEX

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Dec. 1979 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0080569)

## 22 319091

### TRANSPORTATION OF FLORIDA PERISHABLE AGRICULTURAL COMMODITIES

Determine demand and supply of transportation services for perishable agricultural commodities in Florida. Determine effects of Federal and State regulations on transportation efficiency. Investigate alternative systems to improve modal distribution. Identify present trends in production and distribution of Florida perishables. Use of different modes of transportation. Survey carriers in order to determine main characteristics of present truck and rail services. Interview shippers, receivers and carriers in order to assess impact of regulations on transportation. Develop transportation models that would improve present systems and help Florida's competitive position. Work during the reported period consisted of literature review, field visits to perishable product shippers and carriers, and state-wide discussions with members of the Transportation Task Force and other interested parties. Some problems believed to be worthy of research efforts have been identified. An important problem is the finding of alternatives to the present trend in

the modal composition of perishable traffic in which the railroads share has been reduced to around 1%, towards a more balanced system. The energy and environmental implications of the present situation have been recognized and discussed. Also identified has been the need to look at the different regulations affecting the transportation of perishables, and to assess the impact of those regulations on efficiency, particularly as it relates to energy use. It is hypothesized that too much regulation fosters inefficiency in the use of transportation resources. A research project that will serve as a M.S. Thesis has been initiated. This study will try to measure the waste of energy due to regulation that prevents the trucks that transport Florida fresh fruits and vegetables from backhauling non-exempt goods.

PERFORMING AGENCY: Florida University, Gainesville, Department of Food and Resource Economics, FLA-AS-01904

INVESTIGATOR: Dow, JK

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS FLA

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: July 1978 COMPLETION DATE: Sept. 1983

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0075889)

#### 22 319093

##### **COSTS, MARGINS, AND ECONOMICS OF PROCESSING, HANDLING, AND MERCHANDISING FIBERS AND OIL CROPS**

Determine and maintain current cost and charges for processing, handling, storing, and merchandising fiber and oil crops. Analyze the influence on costs of variations in volume, capacity, utilization, location, types of facility, new technology, and related factors. Determine the optimum size, number, location, and configurations of processing and storage facilities needed to satisfy specific domestic and foreign demand under alternative conditions and policies. Use both economic engineering and survey approaches to provide the basic cost data in this project. From this base of information, conduct additional research through budget analyses. Obtain data through secondary sources, equipment manufacturers, university researchers in food and fiber technology, and industry surveys. Use this data in other fiber and oil crop projects. Address questions of optimum size and location of firms within the production, processing and transportation sectors of the fiber and oil crops subsectors, and changing energy and labor costs. Develop simulation models of representative industry firms.

PERFORMING AGENCY: Mississippi Agricultural & Forestry Experiment Station, Fibers Program Area CE Division, ERS, CE-02-014-28-04

INVESTIGATOR: Ghetti, J

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, ERS CED

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041613)

#### 22 319094

##### **COSTS, MARGINS, AND ECONOMICS OF PROCESSING, HANDLING, AND MERCHANDISING FIBERS AND OIL CROPS**

Determine and maintain current cost and charges for processing, handling, storing, and merchandising fiber and oil crops. Analyze the influence on costs of variations in volume, capacity, utilization, location, types of facility, new technology, and related factors. Determine the optimum size, number, location, and configurations of processing and storage facilities needed to satisfy specific domestic and foreign demand under alternative conditions and policies. Use both economic engineering and survey approaches to provide the basic cost data in this project. From this base of information, conduct additional research through budget analyses. Obtain data through secondary sources, equipment manufacturers, university researchers in food and fiber technology, and industry surveys. Use this data in other fiber and oil crop projects. Address questions of optimum size and location of firms within the production, processing and transportation sectors of the fiber and oil crops subsectors, and changing energy and labor costs. Develop simulation models of representative industry firms.

PERFORMING AGENCY: Department of Agriculture, Fibers Program Area, CE Division-ERS, CE-02-014-11-00

INVESTIGATOR: Doty, HO

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, ERS CED

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0043465)

#### 22 319095

##### **COSTS, MARGINS, AND ECONOMICS OF PROCESSING, HANDLING, AND MERCHANDISING FIBERS AND OIL CROPS**

Determine and maintain current cost and charges for processing, handling, storing, and merchandising fiber and oil crops. Analyze the influence on costs of variations in volume, capacity, utilization, location, types of facility, new technology, and related factors. Determine the optimum size, number, location, and configurations of processing and storage facilities needed to satisfy specific domestic and foreign demand under alternative conditions and policies. Use both economic engineering and survey approaches to provide the basic cost data in this project. Form this base of information, conduct additional research through budget analyses. Obtain data through secondary sources, equipment manufacturers, university researchers in food and fiber technology, and industry surveys. Use this data in other fiber and oil crop projects. Address questions of optimum size and location of firms within the production, processing and transportation sectors of the fiber and oil crops subsectors, and changing energy and labor costs. Develop simulation models of representative industry firms.

PERFORMING AGENCY: Texas Technological College, Fibers Program Area CE Division-ERS, CE-02-014-48-06

INVESTIGATOR: Shaw, DL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, ERS CED

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0043466)

#### 22 319914

##### **NET ENERGY ANALYSIS OF SURFACE MINED COAL FROM THE NORTHERN GREAT PLAINS**

The objective of this study is to provide a net energy analysis of surface mined coal from the Northern Great Plains. Four schemes of coal development are evaluated to determine the energy required to deliver coal-derived energy in a bulk form to a load center 1000 miles from the mine. The coal development schemes analyzed are: (1) transport of raw coal by unit train to load center; (2) rail transport of coal followed by load center electrical power generation; (3) mine-mouth electrical power generation with high voltage transmission to load center; and (4) gasification of coal at the mine with pipeline transmission of gas to load center. Several system models are also presented to enhance understanding and overview of the interdependence of the coal resources, the environment, and the economy of the Northern Great Plains. The potential impact of surface mining is addressed as well as the benefits to be obtained from an affirmative reclamation program.

PERFORMING AGENCY: State University System of Florida, Department of Environmental Engineering Science

INVESTIGATOR: Ballentine, T

SPONSORING AGENCY: Department of Energy, EY-76-S-05-4398

Contract

STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Sept. 1972

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (FA 140)

#### 22 323372

##### **PRODUCTIVITY IN PHYSICAL DISTRIBUTION**

In many organizations physical distribution costs are considered as fixed, while the planning of a certain level of service is considered as a constraint dictated by competition. In the last few years, it has been necessary to minimize distribution costs by maintaining a steady level of service. It is proposed to systematically study the following problems: 1) Which elements enter in the calculation of distribution costs?; 2) Which are the elements included in the definition and calculation of the level of service?; 3) How can the relationship between these two concepts be modeled to obtain equilibrium solutions? A global decision making model will be written in the overall context of distribution: interaction between models of inventory levels, choice of transport mode, location and handling, impact on market penetration, and contribution to marketing strategies.

PERFORMING AGENCY: Montreal University, Canada, Center for Research on Transports, Q005UD

SPONSORING AGENCY: Montreal University, Canada, Center for Research on Transports



RESPONSIBLE INDIVIDUAL: Chriqui, C  
STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Feb.  
1979 COMPLETION DATE: June 1981  
ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 323373

#### COAL TRANSPORTATION

With prospects of substantial long term Western Canadian coking and thermal coal markets developing in Ontario, continual growth of export sales via the West Coast to Japan and possible westward movement of coal from Nova Scotia; plausible scenarios of coal traffic can be postulated requiring substantial investment in mainline infrastructure. This program is aimed at gaining an understanding of the system that could be used to transport coal from mines to consumers. This program has been subdivided in two sections: Section I will consider the long distance transportation of coal from Western Canada to Central Canada by unit train, coal slurry, coal gasification and possibly electric transmission. Section II: It is expected that large quantities of coal will be required in Alberta as lower quality fuel for tar sands and for steam generation in oil wells. This section will assess the short distance transportation needs for coal in Western Canada and also the possible movement of Atlantic coal to Quebec.

PERFORMING AGENCY: Transport Canada Research and Development Centre, 065HG

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Johnson, WF

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: Apr.  
1976 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 325447

#### YEAR 2000 STUDY

The objectives of this project are to: (1) characterize the present transportation systems for energy materials; (2) project system characteristics through the year 2000; (3) identify possible problems that could occur in energy material transportation; and (4) suggest actions that could be taken to prevent their occurrence. Such identification of potential problems well in advance of their occurrence will serve to reduce the number and severity of potential crises. The project will include literature searches, workshops, discussions with key personnel in energy and transportation, and analysis of the information obtained.

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs

INVESTIGATOR: Desteese, JG

SPONSORING AGENCY: Department of Energy

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Oct. 1977

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ER 404 1)

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: Sept. 1979 START DATE: Aug. 1975 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$126,000

ACKNOWLEDGMENT: TRAIS, OST

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 has been 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. 1980 START DATE: 1966

ACKNOWLEDGMENT: FRA

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 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 178058

**STUDY OF TRANSFER POLICIES AS THEY AFFECT PERFORMANCE OF AND DEMAND FOR PUBLIC TRANSPORTATION**

This study examined the current use and impacts of 11 potential transfer policy components related to vehicle routing scheduling, pricing, and information for passengers. The effects of each component on operator costs, user satisfaction, ridership and revenue are related to a number of site specific factors. The situations or settings in which particular transfer policies can most beneficially be applied are identified. Guidelines are also provided to aid transit operators in the design of policies to accommodate bus and/or rail transfers.

**REFERENCES:**

State of the Art of Current Practices for Transit Transfers Charles River Associates, Incorporated; Prepared for TSC, June 1980

Operator Guidelines for Transfer Policy Design Charles River Associates, Incorporated Prepared for TSC, June 1980

PERFORMING AGENCY: Charles River Associates, Incorporated, DOT-TSC-1757-8

INVESTIGATOR: Brand, D Tel (617) 266-0500 Nelson, M

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Casey, R Tel (617) 494-2458

CONTRACT DOT-TSC-1757

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: Oct. 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: \$106,000

ACKNOWLEDGMENT: Charles River Associates, Incorporated

23 185231

**DEVELOP A DETAIL OUTLINE, FORMAT AND SCOPE OF A NATIONAL DESIGN PRACTICES MANUAL, PHASE I**

The objective of the National Design Practices Manual Project is to establish minimum criteria for design and safety of Urban Rail Transit Systems. This will allow evaluation of grant (capital funding) requests and development of cost effective design standards. Phase I consists of establishment of a detailed outline of subjects. Phase II consists of supporting a contractor who will develop and utilize source documents identified in Phase I to fill out the outline.

PERFORMING AGENCY: American Public Transit Association, 7216

INVESTIGATOR: Cihak, FJ Tel (202) 331-1100

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-80034

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: \$298,613

ACKNOWLEDGMENT: American Public Transit Association

**23 196744**

## **STUDY OF USER'S EVALUATION OF A TRANSPORTATION SYSTEM**

This study is an investigation of the relationship among the components of consumers' evaluation of intercity transportation modes, with particular emphasis on rail. Focus groups or consumer panels will also be used to generate hypotheses about the ways in which consumers evaluate modes. A special effort will be made during this investigation to understand the nature and determinants of modal affect and its relationship to other attitudinal variables. Models of the psychological, sociological, and environmental factors which determine consumers' modal attitude toward transportation systems will be developed. Data to test these models will be collected, and structural models will be estimated.

PERFORMING AGENCY: Charles River Associates, Incorporated

INVESTIGATOR: Allaman, PM Tel (617) 266-0500

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Dumas, J

Contract DOT-TSC-1581

STATUS: Active NOTICE DATE: July 1979 START DATE: Sept. 1978 COMPLETION DATE: May 1980 TOTAL FUNDS: \$186,366

**23 324511**

## **TRAIN CREW REDUCTIONS FOR INCREASED PRODUCTIVITY OF RAIL TRANSIT**

Train crews on most rail transit systems in U.S. cities tend to be larger than they might be if modern technologies and operating practices were fully utilized. The study will analyze potential crew reductions on different groups of systems. All duties which train crews presently perform will be defined. Possible alternatives to performing each duty will be explored, based on experiences from cities in the U.S. and abroad which operate with smaller crews. Obstacles to crew reduction, such as obsolete labor practices and lack of managerial initiative, will be analyzed and possible solutions proposed.

PERFORMING AGENCY: Pennsylvania University, Philadelphia

INVESTIGATOR: Vuchic, V

SPONSORING AGENCY: Urban Mass Transportation Administration

69985

STATUS: Active NOTICE DATE: Dec. 1980 START DATE: 1980

24 082106

**IOWA RAILROAD STUDY**

The basic goal of this study is to evaluate the economic, social and environmental impacts of alternative rural rail transportation systems in Iowa. The primary focus of this study will be the role of rural branch rail lines.

**REFERENCES:**

An Economic Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, NTIS; 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, N1, Feb. 1977

Executive Summary-An Economics Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, Federal Railroad Administration; US DOT, Mar. 1978

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, 415-40-30-09-1929

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Iowa State Highway Commission, RS-I-DOT-55045; Federal Railroad Administration

Contract DOT-FR-55045

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1974 TOTAL FUNDS: \$257,000

ACKNOWLEDGMENT: Iowa State University, Ames

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, GP

SPONSORING AGENCY: Office of the Secretary of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

STATUS: Active NOTICE DATE: Sept. 1980 START DATE: Aug. 1976 COMPLETION DATE: 1980

ACKNOWLEDGMENT: OST

24 179528

**ECONOMIC ANALYSIS PROGRAM**

This program is the ongoing effort of the Office of Economics involving: (1) Competitive status of the rail industry; (2) Analysis of the regulatory environment of the rail industry; (3) Commodity service involving perishable goods, coal transit efficiency, and wheat gathering analysis, and (4) Economic analysis involving statistics and forecasting.

PERFORMING AGENCY: Federal Railroad Administration

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Stearns, RN Tel (202) 426-7391

STATUS: Active NOTICE DATE: Feb. 1981 COMPLETION DATE: June 1981

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.

**REFERENCES:**

Stability of Motor Carriers Operating Under the Agricultural Exemption, Miklius, W; Casavant, KL, Reg of Entry & Pricing in Truck Transp; Rural Transport Symp, 29(3) 108-109, 1977

Proceedings of National Symposium on Transportation for Agriculture and Rural America, Casavant, KL, US Department of Transportation, DOT-TST-77-33, 1977

Alaska-Washington Trade: An Applied Input-Output Study Logsdon, CL; Casavant, KL, Washington State University, CARC Bulletin 848, 1977

Commercial Navigation on the Snake/Columbia Waterway System: Issues and Prospects, Jones, JR; Casavant, KL, University of Idaho, Idaho Economics No. 2, 1977

Economics and Emerging Issues of Wheat Transportation in the Pacific Northwest, Casavant, KL; Thayer, Washington State University, Circular 612, 1978

An Economic Evaluation of the Regional Differences in Operating Prob & Struc of Agricultural Exempt Motor Carriers, Casavant, KL; Stump, Transportation Research Forum Proceedings, New York, 1978

PERFORMING AGENCY: Washington State University, Department of Agricultural Economics, WNP00379

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS WNP

Contract 701-15-39

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072790)

24 193779

**MIDWEST RAIL SERVICE STUDY**

Impacts of mergers, consolidations, coordinations and bankruptcies are both local and regional in nature. This study addresses state historic and legal roles in evaluating the impacts of service changes and state participation in merger, consolidation, coordination and bankruptcy proceedings. Under 4R Act time limits, the study aids state policy-makers in responding to such proposals and to possible future railroad bankruptcies.

**REFERENCES:**

The State Role in Railroad Restructuring Ernst and Whinney, Sept. 1979  
Retrospective Study of Selected Railroad Mergers Ernst and Whinney, Sept. 1979

Manual for Assessing the Impacts of Railroad Consolidations Ernst and Whinney, Sept. 1979

PERFORMING AGENCY: Ernst and Whinney

INVESTIGATOR: Lutes, GS Tel (202) 862-6000

SPONSORING AGENCY: Iowa Department of Transportation

RESPONSIBLE INDIVIDUAL: Ward, DG Tel (515) 296-1137

Contract DOT-FR-PL-7-IA-01

STATUS: Completed NOTICE DATE: Feb. 1981 START DATE: May 1978

ACKNOWLEDGMENT: Ernst and Ernst

24 315157

**PROPOSED RAIL LINE ACQUISITION, RURAL TRANSPORTATION DEMONSTRATION PROJECT, CATTARAUGUS COUNTY INDUSTRIAL DEVELOPMENT AGENCY**

The State of New York is requesting a grant from their Area Development Allocation to assist the Cattaraugus County Industrial Development Agency in the purchase of approximately 14.1 miles of rail line running from the City of Salamanca to the village of Cattaraugus and 1.0 mile within the township of Gowanda, all in Cattaraugus County, New York. Service on the first line (also known as USRA line 1250) is currently being provided through a lease agreement between the Erie-Lackawanna Railroad and the State of New York. Approximately 250 carloads of freight are moved on this line yearly. The purchase of this portion of the Erie-Lackawanna's lines in



Cattaraugus County would complete county acquisition of all such lines in the county proposed to be abandoned by the bankrupt railroad. In doing so the County hopes to preserve rail service to three major industries in the County and save approximately 300 direct and 150-200 indirect jobs. In addition, the County has entered into discussion with Erie and Chautauqua counties relative to the linking up of a low density rail line in each of these counties with the Cattaraugus trackage in order to form a region-serving short line with service between Buffalo, Gowanda, South Dayton, Waterboro Junction, Dayton, Cattaraugus, Little Valley and Salamanca. These three lines currently generate approximately 1900-2300 carloads of freight on an 80 mile system. In Salamanca line 1250 interchanges directly with the CONRAIL and Chessie Systems. The County IDA has identified some fourteen prime industrial sites in the county; four are located adjacent to the rail line proposed for purchase. The retention of rail service will enhance the marketability of these sites and make it possible for the county to continue to have a well developed industrial promotion program.

PERFORMING AGENCY: New York State Government

SPONSORING AGENCY: Appalachian Regional Commission, NY-6891-79-I-300-060

STATUS: Active NOTICE DATE: July 1980 START DATE: Sept. 1979 TOTAL FUNDS: \$320,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (EF 520)

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

**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

Impacts of Motor Carrier Deregulation on Agriculture, Rural Shippers, and Receivers, Felton, JR; Anderson, DG, 1977

The Costs and Benefits of Motor Truck Regulation Felton, JR, Nebraska University, Dept of Agricultural Economics

Impact of Governmental Regulations on Agriculture Adams, R; et al, NDSU-Old West Regional Commission Task Force, 49 p., 1978

The Impact of Rate Regulation Upon Common Carrier Back Hauls, Felton, JR, Univ of Nebraska, Lincoln, Dept of Agricultural Economics, Rpt. 88 23 p., 1978

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, CSRS NEB

INVESTIGATOR: Anderson, DG

SPONSORING AGENCY: Department of Agriculture, NEB-10-071

STATUS: Active NOTICE DATE: Aug. 1980 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070254)

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.

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. 1980 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: Feb. 1981 START DATE: Jan. 1977 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$290,000

ACKNOWLEDGMENT: OST

25 188665

**STATE RAIL PROGRAM EVALUATION**

Evaluation of light density line rehabilitation project funded under the Local Rail Service Assistance Act of 1978. The contractor will perform case studies of five projects and develop a continuing evaluation process for rehabilitation projects.

PERFORMING AGENCY: Ernst and Whinney

INVESTIGATOR: Tyndall, GR Tel (202) 862-6000 Taggart, RE Liff, M

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Tusaie, W. Tel (202) 426-1677

Contract DOT-FR-53-80-C-00100

STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1980 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: Ernst and Ernst

25 193783

**PLANNING FOR REGIONAL ECONOMIC DEVELOPMENT**

The purpose of the research project is to examine the regional economic development that occurs as a result of specific government policies and to assist states as they develop their state economic planning capabilities. The primary emphasis of the research is on determining how the multiregional input-output (MRIO) model and related techniques of regional economic analysis can be used at the state level for the planning and evaluation of state economic development policies. The research is especially focused on policies related to transportation and energy and their impacts on employment and income in the regions.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Polenske, KR

SPONSORING AGENCY: Economic Development Administration; Federal Railroad Administration

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Oct. 1976 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Massachusetts Institute of Technology

25 308312

**TRUCK SIZE AND WEIGHT STUDY**

Provide analytic support to the U.S. Department of Transportation for a Congressional study on the benefits and costs of alternative national truck size and weight limits. Continuation of the "grandfather" clause will be examined as well as national uniform limits. Impacts will be studied on pavements, bridges, energy consumption, competition with railroads, safety, regional economic impacts, and environmental factors.

PERFORMING AGENCY: System Design Concepts, Incorporated  
 INVESTIGATOR: Stowers, J Tel (202) 393-5911  
 SPONSORING AGENCY: Department of Transportation, Office of Intermodal Transportation  
 RESPONSIBLE INDIVIDUAL: Swerdloff, CN Tel (202) 426-4163  
 CONTRACT DOT-OS-90073  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: May 1979 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$320,000  
 ACKNOWLEDGMENT: DOT

25 316081

## THE ASSESSMENT OF TECHNOLOGICAL CHANGE IN REGULATED INDUSTRIES

This is a renewal of a project started in September 1976 (APR76-23556). The objective of this research project is to develop analytic methods for assessing the impact of regulation on technological change. The approach is to estimate the impact of regulation on productivity through its impact on technological change by controlling for all major factors other than regulation that influence productivity. The research compares the performances of selected U.S. and Canadian railroads, barges and trucking firms, to estimate the efficiency losses due to regulation in the U.S. 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 time-series analysis and time series-cross-section analysis to estimate the technological progress of the rail, truck and barge industries in the U.S. and Canada.

PERFORMING AGENCY: Data Resources Incorporated  
 INVESTIGATOR: Christensen, LR  
 SPONSORING AGENCY: National Science Foundation, Directorate for Engineering and Applied Science, DAR78-11061  
 STATUS: Active NOTICE DATE: June 1980 START DATE: Sept. 1976 COMPLETION DATE: Feb. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1697 3)

25 319908

## POLITICAL AND ECONOMIC DETERMINANTS OF REGULATORY DECISIONS

This grant supports research examining how government regulations bring about outcomes that differ from those that would occur if left to the forces of the market. It examines the operation of the Interstate Commerce Commission on the particular question of abandonment of railroad lines. It seeks to develop and implement an empirically based methodology for systematically assessing the relative effects of considerations of economic efficiency, the political interests of the agencies and local groups, and the particular interests of shippers and the railroads on ICC abandonment decisions. The study collects detailed economic and political data on a large sample of ICC decisions during the period 1968-1979. With these data the analysis of the relative importance of political activities and economic factors in abandonment cases will contribute to an understanding of market exit regulation and the role of public participation and adversarial proceedings in regulatory policy-making.

PERFORMING AGENCY: Rochester University, Department of Political Science  
 INVESTIGATOR: Riker, WH  
 SPONSORING AGENCY: National Science Foundation, Directorate for Biological Behavioral and Social Sciences, SES79-25631  
 STATUS: Active NOTICE DATE: Nov. 1980 START DATE: Feb. 1980 COMPLETION DATE: July 1982 TOTAL FUNDS: \$24,099

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (EH 895)

25 329562

## GREAT LAKES BASIN COMMISSION, TRANSPORTATION STUDY

The study was initially proposed to be a two year effort designed to provide a range of policy options to deal with anticipated commodity and goods transportation problems affecting the various freight transportation modes

in the Great Lakes region, based on the results of existing state and federal transportation plans and studies. The first year effort will integrate the results-assumptions, projections, alternatives and effects of these studies. The focus will be on regional concerns and effects raised in these studies which can be related to transportation concerns at the national level.

PERFORMING AGENCY: Great Lakes Basin Commission  
 INVESTIGATOR: Job, C Tel (313) 668-2325 Gurioli, L Waldrup, P  
 SPONSORING AGENCY: Great Lakes Basin Commission  
 RESPONSIBLE INDIVIDUAL: Job, C Tel (313) 668-2340  
 STATUS: Active NOTICE DATE: Feb. 1981 START DATE: Dec. 1980  
 ACKNOWLEDGMENT: Great Lakes Basin Commission



26 058329

**RAILROAD RESEARCH INFORMATION SERVICE (RRIS)**

Acquisition, 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: Mar. 1980 START DATE: Apr. 1977 COMPLETION DATE: Sept. 1982

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: Feb. 1981 START DATE: 1970

ACKNOWLEDGMENT: AAR



# Source Index

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.

## A

**ABERDEEN PROVING GROUNDS** Army Armament Res & Dev Command, Ballistics Research Lab; Aberdeen, Maryland

09 314149

**ABT ASSOCIATES, INCORPORATED** 55 Wheeler Street; Cambridge, Massachusetts, 02138

15A 188644

**ACEC REVUE** BP4; 6000 Charleroi, Belgium

09 329950

**ACIER/STAHL/STEEL** Centre Belgo-Luxem d'Information de l'Acier; 47 rue Montoyer; B-1040 Brussels, Belgium

00 322526

**ADD SYSTEMS** 2704 Easton Drive; Burlingame, California, 94010

03 322190

**AEG-TELEFUNKEN. WISSENSCHAFTLICHE BERICHTE** Elitera Verlag GmbH; Fritz-Wildungstrasse 22; 1 Berlin 33, West Germany

13 322022

**AEG-TELEFUNKEN PROGRESS** Elitera Verlag GmbH; Fritz-Wildungstrasse 22; 1 Berlin 33, West Germany

04 325894, 04 325895

**AEROSPACE CORPORATION** 955 L'Enfant Plaza North, SW, Suite 4040; Washington, D.C., 20024

03A 308331

**AGBABIAN ASSOCIATES** 250 North Nash Street; El Segundo, California, 90245

00A 179344

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**ZHELEZNODOROZHNYI TRANSPORT** USSR Ministry of Railways;  
Novo-Basmanaya Ulitsa 4; Moscow B-174, USSR  
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02 319993, 06 324936, 10 323347, 17 319921, 17 320304, 21A 170620,  
21A 170622, 21A 188662, 21A 196733, 21A 196734, 21A 319078, 21 319928,  
21 319953, 21 322177, 21 322178, 21 322182, 21 322187, 21 322189,  
21 322913, 21 323201, 21 324418, 21 324419, 21 324931, 26 318779

**YARD THROUGHPUT**  
05 325719, 06A 136338, 06A 159656, 06 319950, 17A 196726, 21A 196733,  
21A 196734, 21 319953, 21 322178, 21 322182, 21 322187, 21 322218,  
21 322904, 21 322917, 21 322920, 21 323201, 21 324931, 22A 319087

**YARDS AND TERMINALS**  
16 322958, 21A 138527, 21A 157598, 21A 170622



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