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August 1979 and January 1980

U.S. DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration

Prepared under contract by

Railroad Research Information Service
Transportation Research Board

The Railroad Research Information Service (RRIS) was developed by the Transportation Research Board under contract to the Federal Railroad Administration, U.S. Department of Transportation. The computerized data system incorporates information on the planning, building, managing, operation, and regulation of rail transportation systems. A primary objective is to acquire and select information that will be timely and useful. Three types of data are stored in the system: abstracts of articles and reports, descriptions of computer programs and data sets, and summaries of ongoing and recently completed research projects.

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

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

The National Academy of Sciences was established by a congressional act of incorporation signed by President Abraham Lincoln on March 3, 1863, to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance. It is a private, honorary organization of more than 1000 scientists elected on the basis of outstanding contributions to knowledge and is supported by private and public funds. Under the terms of its congressional charter, the Academy is called upon to act as an official–yet independent–advisor to the federal government in any matter of science and technology, although it is not a government agency and its activities are not limited to those on behalf of the government.

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

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16. Abstract

This publication contains 1,134 abstracts of journal articles and research reports and descriptions of computer programs and magnetic data tapes. It also has 427 summaries of ongoing research activities in the railroad field. The material, selected from current railroad literature and other contemporary sources, covers the entire range of railroading from technology to operations, management, economics and government involvement. Literature sources are worldwide. The material is arranged according to the RRIS classification scheme in two separate sections, one for the abstracts and descriptions and the other for ongoing project summaries. This publication supplements material in the 13 prior Railroad Research Bulletins which should be retained for a complete file of RRIS data.

17. Key Words	18. Distribution Statement
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Price $25.00

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Notice
The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Shirley A. Morin, Information Operations Supervisor

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
2101 Constitution Avenue, N.W.
Washington, DC 20418

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Computer retrieval	$50/request plus 25¢/printout page
Add for computer-prepared indexes	$20/request plus 35¢/printout page

ONLINE SEARCHES
The RRIS data base may be searched by using the Lockheed DIALOG Information Service; applicable online rates are available from Lockheed. DIALOG service covering RRIS citations is available only to U.S. and Canadian users.

Contents

Foreword

This *Bulletin*, containing 1134 abstracts of journal articles, research reports, computer programs, and magnetic tape data sets and 427 summaries of ongong research activities, covers material accessioned by the Railroad Research Information Service between August 1979 and January 1980.

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.

RRIS FILE SEARCHES

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

The fee schedule for RRIS title searches reflects the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services. The charge for computer retrieval from the RRIS file is $50 per request plus $0.25 per citation after screening by RRIS. A written authorization or purchase order is required before the retrieval is made.

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The RRIS data base may be searched online through the Lockheed DIALOG Information Retrieval Service. This method of access is handled entirely through Lockheed and is available only to its users in the United States and Canada. RRIS citations are updated monthly in Lockheed File 63. Contact Lockheed Information Systems, 3460 Hillview Avenue, Palo Alto, CA 94304; telephone 800-227-1960 (in California, 800-982-5838). RRIS can supply a listing of its key words with frequency counts as an aid to DIALOG users; contact RRIS for ordering information.

Availability of Documents

An availablity 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.

AAR
Association of American Railroads
1920 L Street, N.W.
Washington, DC 20036

AAR
For technical reports identified by a report number such as R-253:
Association of American Railroads
Technical Center
3140 South Federal Street
Chicago, IL 60616

AIAA
American Institute of Aeronautics and Astronautics
Technical Information Service
750 Third Avenue
New York, NY 10017

AREA
American Railway Engineering Association
2000 L Street N.W.
Washington, DC 20036

ASCE
American Society of Civil Engineers
345 East 47th Street
New York, NY 10017

ASME
American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

CIGGT
Canadian Institute of Guided Ground Transport
Queen's University
Kingston, Ontario K7L 3N6
Canada

DOT
U.S. Department of Transportation
Nassif Building
400 Seventh Street, S.W.
Washington, DC 20590

ECMT
All documents available through OECD (see below)

ESL
Engineering Societies Library
345 East 47th Street
New York, NY 10017

FRA
Federal Railroad Administration
400 Seventh Street, S.W.
Washington, DC 20590

GPO
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

IEEE
Institute of Electrical and Electronics Engineers
Service Center
445 Hoes Lane
Piscataway, NJ 08854

IPC
IPC (America), Inc.
205 East 42nd Street
New York, NY 10017

*IT
Transport Publishing House

*MPS
USSR Ministry of Railways

NAE/NAS/NRC
National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, DC 20418

NTIS
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

OECD
OECD Publications Center
Room 1207
1750 Pennsylvania Avenue, N.W.
Washington, DC 20006

ORE
See UIC/ORE below.

OST
Office of the Secretary
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, DC 20590

RPI
Railway Progress Institute
700 North Fairfax Street
Alexandria, VA 22314

RTAC
Roads and Transportation Association of Canada
875 Carling Avenue
Ottawa, Ontario K1S 5A4
Canada

SAE
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, PA 15096

SNAME
Society of Naval Architects and Marine Engineers
74 Trinity Place
New York, NY 10006

TRB
Transportation Research Board
Publications Office
2101 Constitution Avenue, N.W.
Washington, DC 20418

TRRL
Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU
England

TSC
Transportation Systems Center
55 Broadway
Cambridge, MA 02142

*TsNIITEI
Central Scientific Research Institute of Information and Technical and Economic Research

UIC
International Union of Railways, BD
14-16 Rue Jean-Rey
75015 Paris
France

UIC/ORE
For technical reports identified by a report number such as B125/RP3/E (note restrictions page vii)
International Union of Railways
Office for Research and Experiments
Oudenoord 60
Utrecht, Netherlands

UITP
International Union of Public Transport
Avenue de l'Uruguay 19
B-1050, Brussels
Belgium

UMI
University Microfilms International
300 North Zeeb Road
Ann Arbor, MI 48106

UMTA
Urban Mass Transportation Administration
400 Seventh Street, S.W.
Washington, DC 20590

*Publications from this source and any other documents of Russian origin must be ordered in the United States through Victor Kamkin Bookstore, Inc., 12224 Parklawn Drive, Rockville, MD 20852.

Loan and Photocopy Services

Loans of books and reports and photocopies of articles and conference papers referenced by the Railroad Research Information Service may be obtained from four transportation libraries designated as TRISNET Centers. Two of them are Regional Centers:

Transportation Center Library
Northwestern University
Evanston, IL 60201
312-492-5273
TWX 910-231-0872

Institute of Transportation Studies Library
University of California
412 McLaughlin Hall
Berkeley, CA 94720
415-642-3604

Two are Federal Centers:

Headquarters Library
U.S. Department of Transportation
400 Seventh Street, SW
Washington, DC 20590
202-426-1792

Technical Information Center
Transportation Systems Center
U.S. Department of Transportation
Kendall Square
Cambridge, MA 02142
617-494-2016

The four centers are not RRIS repositories; copies of all RRIS-referenced publications are not added to their collections automatically. Each does have a collection of transportation publications and all research reports, in microfiche or paper copy, that have been issued by the U.S. Department of Transportation and distributed through the National Technical Information Service.

The centers cannot supply reports of or information on research that is in progress. Such information can usually be obtained from the principal investigator at the contracting agency or the project monitor at the sponsoring agency.

REGIONAL CENTERS

RRIS users outside the U.S. Department of Transportation should contact the Regional Center at Northwestern University or at the University of California, Berkeley. An invoice is sent with the requested document; the Regional Centers request that payment not be made in advance.

Northwestern University will accept requests for loans and photocopies by telephone, letter, or interlibrary loan form. The University of California will accept requests for photocopies by telephone or letter, but requires an interlibrary loan form for books and reports.

Requests for publications by loan or photocopy should include either a copy of the entry in the RRIS publication or the following information:

1. TRIS accession number (six-digit number at top of citation);
2. Title;
3. Author, including individuals and organizations responsible for the publication; and
4. Publication data, including publisher, periodical title, conference, date, paging, serial numbers.

The library responding to the request will lend books and reports for two weeks plus the estimated mailing time.

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The DOT Headquarters Library does have an RRIS repository where a significant collection of documents acquired by RRIS is available. These may be used at the Library.

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Many of the publications referenced by RRIS are available in local transportation libraries or through a public or state library. Each of these libraries will also prepare and process an interlibrary loan form on request.

COMMERCIAL PHOTOCOPY SERVICES

Two major services can supply photocopies of journal articles, technical papers, and certain other material at standard rates. They are cited in many RRIS availability statements.

Engineering Societies Library
345 East 47th Street
New York, NY 10017
212-644-7611

University Microfilms International
300 North Zeeb Road
Ann Arbor, MI 48106
313-761-4700

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

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

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

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Abbreviations

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

*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 → **TEST TRAIN PROGRAM SIXTH PROGRESS REPORT**

Research report abstract → **This report describes the progress of the Rail Research Program involving operation of the FRA test cars and the performance of other rail research efforts during the period 1 July 1973 to 30 June 1974. Highlights of the work reported include operation of the FRA test cars to perform track surveys and other rail research activities; test car upgrading; expansion of the Rail Research Program; and data management and data analysis tasks which have been undertaken to benefit railroad technology. The Rail Research Program primarily involves the operation and instrumentation of the FRA test cars. This research program is designed to provide high-speed measurement of railroad track characteristics, development of comprehensive track measurement techniques, development of special testing instrumentation, and data evaluation through analysis and electronic processing.**

Supplementary notes → **Sponsorship was from FRA, DOT.**

Authors, publication data, document data → **Peterson, C Kaufman, WM Yang, TL Corbin, JC ENSCO, Incorporated, (DOT-FR-74-19) Prog Rpt. FRA-ORD&D-75-25, June 1974, 124 pp, 36 Fig.**

Activity data → **Contract DOT-FR-20032**

Source of abstract → **ACKNOWLEDGMENT: FRA**

Availability → **PURCHASE FROM: NTIS Repr. PC, Microfiche**

NTIS accession number → **PB-247084/AS, DOTL NTIS**

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 → **INVESTIGATION INTO CAUSES OF RAIL CORRUGATIONS**

Journal article abstract → Heavy traffic density and high-capacity cars increased wear and abrasion or curves which CP Rail countered with lubricators that cut flange abrasion but produced rail corrugation with a wavelength of 8 to 28 inches on the low rail. Plastic flow or rail head metal combined with surface fatigue are predominately responsible for rail corrugation. Recommendations for overcoming the problem includes improved wheel rail contact geometry through elimination of wide gauge, elimination of false flanges on wheels, reduction of railhead curvature and modification of the AAR wheel profile; cutting of lateral frictional force by use of self-steering trucks; changes in rail metallurgy to increase resistance to surface fatigue and plastic flow, reduction of dynamic loadings and improved flange lubrication techniques.

Author, publication data, document data → Kalousek, J Klein, R *AREA Bulletin* Vol. 77 Bulletin, Jan. 1976, pp 429-48, 15 Fig., 2 Tab., 7 Ref.

Source of abstract → ACKNOWLEDGMENT: AREA Bulletin

Availability → PURCHASE FROM: ESL Repr. PC, Microfilm

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

Abstract of a non-U.S. journal article

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

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

Title in original language →

Journal article abstract → 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]

Language of full-text article →

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

Source of abstract → ACKNOWLEDGMENT: UIC

Availability → ORDER FROM: ESL

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

The summaries of ongoing research describe research activities currently in progress or recently completed. Each summary indicates who is performing the project, who is funding it, and how the research goal is to be attained. A summary is not a document surrogate; that is, there may not be a full report published on the project. The summaries are in the format shown below, although each one may not contain all the elements given in this sample. The document record numbers and the order listing are the same for both summaries and abstracts.

Summary of ongoing research

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

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

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

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

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

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

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

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

Source of this summary → ACKNOWLEDGMENT: FRA

Abstracts of Reports and Journal Articles

00 Right-of-Way

00 053340
FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. TESTS WITH SMALL I-BEAMS WITH A LOW STRESS LOAD SPECTRUM
This report contains a description of the results of 3 tests, carried out on small I-beams with welded-on stiffeners under spectral load. Plates are welded on the compression flange in the longitudinal and lateral directions. Two sources of fatigue strength data and the maximum likelihood method were used to analyse the results. The available data did not suffice, however, to determine differences between the fatigue strength curves.

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

International Union of Railways D 130/RP 8, Apr. 1979, 26 p., 27 Fig., 21 Tab.

ORDER FROM: UIC

DOTL RP

00 053343
EVALUATION OF STRAIN MEASUREMENTS FROM TESTS WITH BEAMS ORE D 130
The report deals with the analysis of strain measurements on both I and box girders butt-welded mid-beam and provided with various welded attachments on the flanges and webs. The problem is whether it is possible to predict yield strength when the local strain ranges near stress concentration points susceptible to fatigue fracture are measured with suitably arranged strain gauges.

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

Haibach, E Wendt, U Davies, J (British Railways Board)
International Union of Railways DT 75 (D130), May 1979, 12 p., 55 Fig.

ORDER FROM: UIC

DOTL RP

00 053344
FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES
The report presents the results of a statistical analysis of all the fatigue tests carried out by the Committee Members using the method of maximum likelihood. Design procedures for the principal types of welded connections used in bridge work are outlined together with recommendations for their application to the weldments of smaller structures. The report also includes the method of dealing with the variable amplitude loading experienced by bridge members under service conditions, using the rain-flow method of cycle counting and the Palmgren-Miner hypothesis of cumulative fatigue damage.

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

International Union of Railways Final Rpt. D 130/RP 10, Apr. 1979, 37 p., 23 Fig., 11 Tab.

ORDER FROM: UIC

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00 194751
RANDOMDEC: MATHEMATICAL BACKGROUND AND APPLICATION TO DETECTION OF STRUCTURAL DETERIORATION IN BRIDGES
The application of Randomdec analysis to the detection of flaws in highway bridges is investigated analytically and experimentally. The analytical study shows basic properties of the method including the relationship between the Randomdec signature, the amplitude spectrum and the modal response of the system. The experimental program included a field study on five bridges and a laboratory study on samples with induced fatigue cracks. The bridge work produced results on signature characteristics of different types of structural members and on the detection of structural changes in a bridge under dynamic testing. The laboratory study showed that within the frequency range of 1-10 KHz, crack growth in the range of 0.25 to 0.7 cm can be detected at distances up to about one meter. /FHWA/

Reed, RE, Jr Cole, HA, Jr
Nielsen Engineering and Research Incorporated, National Aeronautics and Space Administration, (NEAR TR 124) Final Rpt. FHWA-RD-76-181, Sept. 1976, 180 p.
SPONSORING AGENCY:
RESPONSIBLE INDIVIDUAL: Ballinger, CA Tel (HRS-11) Miller, RJ

ACKNOWLEDGMENT: Federal Highway Administration
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PB-295625/AS

00 195596
THE PREDICTION OF FATIGUE STRENGTH OF WELDED DETAILS
This report provides a means of estimating the stress concentration effects when predicting the fatigue life of several welded details. The results of an analytical study of the fatigue behavior of welded stiffeners and cover plates were compared with the test data reported in NCHRP Reports 102 and 147. The comparison indicated that the variation in test data could be accounted for by considering the probable variation in initial crack sizes and crack growth rates. The stress gradient correction factors developed for stiffeners and cover plates welded to beam flanges provide the necessary analytical tools for estimating the applicable stress intensity factors. In this study a lower bound crack shape relationship was utilized which was derived from cracks that formed at the weld toes of full size coverplated beams. /FHWA/

Sponsored by the Pennsylvania Department of Transportation. Prepared in cooperation with the Department of Transportation, Federal Highway Administration.

Zettlemoyer, N Fisher, JW
Lehigh University, Pennsylvania Department of Transportation, (386-10(78)) Intrm Rpt. FHWA-RD-79-S0850, May 1978, 98 p.
SPONSORING AGENCY:

HP&R 7203

ACKNOWLEDGMENT: Federal Highway Administration
ORDER FROM: NTIS

PB-296407/0ST

00 197698
CASE STUDIES OF BUILDING BEHAVIOR IN RESPONSE TO ADJACENT EXCAVATION
A substantial portion of the cost of soft ground tunnels and braced excavations in urban environments is devoted to the protection and repair of adjacent structures and utilities. Often, the choice between cut-and-cover tunnel construction is based on the potential ground movements associated with each method and the anticipated response of the nearby buildings to these ground movements. In some instances, the locations of tunnel routes and large braced excavations are selected to avoid large and/or sensitive structures. This report summarizes one year of field observations and data collection of the ground movement and resultant building distortion and

change in response to underground construction. It documents case histories of the distortion and damage to structures adjacent to tunnels and excavations. Measurements of ground movements and building response were made at two test sites in Washington, D.C. The sites were a nine-story apartment building adjacent to a 60-foot-deep opencut and a pair of two-story brick-bearing wall structures near two 21-foot-diameter tunnels. The structures at the test sites were instrumented to measure settlement and tilt of the bearing walls and foundations. Both lateral and diagonal displacements were measured with tape extensometers extending between column lines and bearing walls at various floor levels in the structures. From these data, the slope of the settlement trough could be separated into the components causing angular distortion and tilt of the structure. Lateral extension, shearing, or bending could also be distinguished from the data. Additional data were gathered at other sites in Washington, D.C. and in Chicago, Illinois through construction records and field inspections. The ground surface settlement data, building response data, and the progress of the excavation are compared and related.

Boscardin, MD Cording, EJ O'Rourke, TD
Illinois University, Urbana, Urban Mass Transportation Administration, (UMTA-IL-06-0043) Final Rpt. UILU-ENG-78-2023, UMTA-IL-06-0043-78-2, Oct. 1978, 141 p.

Contract DOT-UT-80039

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-295757/9ST

00 197967
RECORD WINTER STORMS IN ILLINOIS, 1977-1978
The Midwest, including Illinois, experienced in 1977-1978 its most severe winter since weather records began in the early 19th century. The major impact in Illinois came from a record-breaking number of 18 severe winter storms. In a normal year, only 4 storms occur. The record winter began with three snowstorms in late November and ended with an extremely damaging ice storm in late March. Unusual snow patterns occurred with several storms, and they lasted in Illinois much longer than usual. Weather conditions (low pressure centers) producing many of the storms were more often of Canadian origin than usual, and these lows had lower pressure and moved slower than normal, resulting in higher surface winds and longer lasting and hence more severe storms. Cold temperatures coupled with the frequent snowstorms resulted in record long-lasting snow cover with up to 120 days with 1 inch or more cover in northern Illinois and 90 days in southern Illinois. The storms led to deaths of 62 persons and injuries to more than 2,000. Utilities and communication systems suffered great losses due to damage to lines, poles and towers. Transportation losses included damaged vehicles, delayed shipments, and great delays in bus and airline service; however, railroads benefited with increased usage, and helicopters and snowmobiles proved valuable in rescue service. The local, state, and federal institutions were beset with enormous and costly problems, including care of roads and lost taxable income due to absenteeism.

Prepared in cooperation with Illinois Dept. of Registration and Education, Springfield.

Changnon, SAJ Changnon, D
Illinois State Water Survey, Illinois Department of Registration & Education, Office of Water Research and Technology ISWS/RI-88/78, W79-05013, 1978, 30 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293181/4ST

00 198024
RECOMMENDATIONS FOR BETTER MANAGEMENT OF MAJOR UNDERGROUND CONSTRUCTION PROJECTS. EXECUTIVE PRESENTATION
This report identifies procedures and practices in major underground construction projects and recommends improved procedures that will ensure more efficient and economic execution of these projects. It is the continuation of a previous study by the subcommittee on Contracting Practices of the U.S. National Committee on Tunneling Technology which noted that many of the problems encountered in the contracting and construction phases of underground projects result from actions taken in development, pre-design, and design phases. A hypothetical model of a major urban underground transportation construction project is described in detail. One of the most important causes of management is delayed decisive action. Thirty-nine most critical elements of a project are listed. Steps leading to completion and operation of the project are outlined. Recommended objectives and specific recommendations to support each objective are presented in the concluding section. The report is intended for use by government organizations, professional associations, and industry concerned with underground construction.

National Committee on Tunneling Technology, Office of the Secretary of Transportation, Urban Mass Transportation Administration, National Science Foundation NSF/RA-780467, 1978, 31 p.

Grant NSF-DAR76-21335

ACKNOWLEDGMENT: NTIS
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PB-293543/5ST

00 198284
THE ATLANTA RESEARCH CHAMBER; APPLIED RESEARCH FOR TUNNELS: BLASTING TECHNIQUES, CONVENTIONAL SHOTCRETE, STEEL-FIBER-REINFORCED SHOTCRETE. MONOGRAPHS ON THE STATE-OF-THE-ART OF TUNNELING
This report describes the construction of the Atlanta Research Chamber and the research conducted in it. In addition, 24 monographs on the state-of-the-art of modern tunnel practice are included. The Atlanta Research Chamber was conceived as a team effort of 18 individuals from twelve engineering firms in the United States, Canada, and Austria to combine their special expertise to study various aspects of tunnel support system in hard rock. It was primarily a practical effort by practical engineers, attempting to develop useful tools for tunnel designers and builders. Later, the team was expanded, and a number of team members were asked to write monographs on modern tunnel practice. All have practical application, and by being gathered together in one volume, may serve to promote the common goal, which is to construct underground space economically and safely. To balance these predominately technical monographs, new team members were recruited to write monographs representing owners, contractors, labor, legal aspects, insurance, overseas practice, and additional technical ideas.

Rose, DC
Metropolitan Atlanta Rapid Transit Authority, Urban Mass Transportation Administration, (UMTA-GA-06-0007) Intrm Rpt. UMTA-GA-06-0007-79-1, June 1979, 361 p.

ACKNOWLEDGMENT: NTIS
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PB-297574/6ST

00 198484
CONCRETE POLYMER COMPOSITES (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)
The citations cover worldwide research on concrete polymer composites including both polymer aggregate concretes as well as polymer impregnated portland cement concretes. The reports discuss their production, hardening, uses, and properties. Also cited are studies on applications such as piping, building panels, bridge decking, tunnel supports, and highway pavements. (This updated bibliography contains 185 abstracts, 23 of which are new entries to the previous edition.)

Habercom, GE, Jr
National Technical Information Service July 1979, 91 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0628/2ST

00 198656
TIMBER PILINGS: MAINTENANCE AND INSPECTION SUMMARY OF A PANEL DISCUSSION
The panel discussion concerned with maintenance and inspection of timber pilings attracted about 100 attendees (including ten who registered only for this event) to a lively evening session. Timber pilings are used in large numbers in bridge structures and for harbor and navigational facilities. The inspection and maintenance of these pilings, to prevent failures such as the collapse of the Coos Bay bridge in Oregon in 1977 (because of damage caused by marine borers), was the topic for discussion.

Pub. in Proceedings of the Nondestructive Testing of Wood Symposium (4th) Held at Vancouver, WA. on August 28-30, 1978, p155-159 1979.

Kaiserlik, J Berger, H McGogney, C
National Bureau of Standards Final Rpt. 1979, 5 p.

ACKNOWLEDGMENT: NTIS
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PB-296120/9ST

00 199068
MATERIALS HANDLING FOR URBAN TUNNELING IN ROCK
An examination of prior forecasts of tunnel construction provides an estimate of 2.4 million feet of rock tunnel to be constructed during the 1976-2000 period. Tunnel projects for the near term (1980) and far term (1990) periods are defined for study. The flow and characteristics of materials handled are defined for the tunnel projects. The state-of-the-art and status of R&D programs for materials handling are reviewed. Based on extensive interviews with representatives of tunnel contractors, equipment manufacturers, government agencies, and consultants, the application of various methods of material handling to tunneling is discussed, including conventional rail haulage, crane and hoist lifting, and horizontal transport and lifting by hydraulic and pneumatic pipeline and by conveyor. Total job cost estimates using these modes of material transport are obtained (with material handling costs isolated) by modification of an estimating technique used for preparing contractor bid estimates. A comparison of the results indicates that major cost savings through substitution of alternative material handling modes should not be anticipated. R&D program elements are recommended to assure that material transport will not become the limiting factor as the rate of tunnel excavation increases in future years.

Duncan, JM Giamboni, LA Schneider, HV Sperry, PE
Holmes and Narver, Incorporated, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. UMTA-MA-06-0100-79-9, May 1979, 349 p.

Contract DOT-TSC-1281

ACKNOWLEDGMENT: NTIS
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PB-299117/2ST

00 300399
CONCERNING PRESSURE-GROUTED SOIL ANCHORS
Until recently, anchored sheet piling walls were almost exclusively provided with long horizontal anchors that had anchor walls, slabs, deadmen, or pile clusters at their ends. These were anchored in the passive zone of the soil wedge behind the classical rupture wedge of soil. A relatively new method in foundation engineering for back-tying of excavation walls is the pressure-grouted soil anchorage. This new kind of soil anchorage system has now become an important element in current foundation-engineering practice. It has gained increased significance and popularity, and its use continues to increase. This paper describes some of the basic principles involved in the tie-back anchorage or wall-anchor-soil system, reviews a basic type of soil anchor, and presents a method for stability analysis of a pressure-grouted soil anchorage system. /Author/

This paper appeared in TRB Record No. 690, Stabilization and Compaction.

Jumikis, AR (Rutgers University, New Brunswick) *Transportation Research Record* No. 690, 1978, pp 8-13, 3 Fig., 1 Tab., 14 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

00 300470
FRACTURE MECHANICS FOR BRIDGE DESIGN
This report provides an introduction to the elements of fracture mechanics for bridge design. Fracture mechanics concepts are introduced and used as the basis for understanding fatigue and fracture in bridge structures. Various applications are cited. /FHWA/

Sponsored by the Federal Highway Administration.

Roberts, R Barsom, JM Rolfe, ST Fisher, JW
Lehigh University Final Rpt. FHWA-RD-78- 68, July 1977, 213 p.
SPONSORING AGENCY:
RESPONSIBLE INDIVIDUAL: McGogney, CH (HRS-11)

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00 300471
STUDENT WORKBOOK-FRACTURE MECHANICS FOR BRIDGE DESIGN
This workbook is a companion to the volume Fracture Mechanics for Bridge Design which provides an introduction to the elements of fracture mechanics for bridge design. Fracture mechanics are introduced and used as the basis for understanding fatigue and fracture in bridge structures. Various applications are cited. /FHWA/

Roberts, R Barsom, JM Rolfe, ST Fisher, JW
Lehigh University Final Rpt. FHWA-RD-78- 69, July 1977, 288 p.
SPONSORING AGENCY:
RESPONSIBLE INDIVIDUAL: McGogney, CH (HRS-11)

Contract P.O. No. 5-3-0209

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00 300556
FRACTURED BRIDGE SUPPORTS STABILIZED UNDER TRAFFIC
Masonary abutments for a steel truss bridge on a mountain main line in western Canada fractured because of displacements of the supporting rock. Analysis of the fractures in the granite and method for anchoring this rock at a remote site are described.

Wyllie, DC (Golder Associates, Canada) *Railway Track and Structures* Vol. 75 No. 7, July 1979, p 28, 4 Fig.

ORDER FROM: ESL

DOTL JC

00 300574
BRIDGES OF SPECIAL DESIGN ON TRANS-SANRIKU RAILWAY
The article outlines the design and execution procedure of modernized railroad bridges in Japan which are concrete arch, prestressed concrete truss, and cable stayed prestressed concrete bridges. The experiences gained in the design and construction of the bridges of special design and the result as well as achievements of various experiments and studies at the stages of design and work are discussed.

Arai, M Sawano, K *Civil Engineering in Japan* Vol. 17 1978, pp 134-145

ACKNOWLEDGMENT: EI
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00 300578
LONGITUDINAL FORCES ON BRIDGES
The author discusses bearing and acceleration forces on bridges and interaction between track and structures. A prestressed concrete span of 21 multiplied by (times) 5 m in Czechoslovakia was tested before and after replacing steel bearings with neoprene bearings. Total bearing reactions were reduced from about 70 percent of braking force to around 30-40 percent.

Bramall, B (Victoria University of Manchester, England) *Railway Engineer International* Vol. 4 No. 1, Jan. 1979, pp 45-46

ACKNOWLEDGMENT: EI
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DOTL JC

00 300582
EXPERIMENTS TO STOP WATER LEAKS IN TUNNELS [Erfahrungen beim Beseitigen von Wasserdurchsickerungen in Tunnel]
No Abstract. [German]

Dostal, J *Zeitschrift der OSShD* Vol. 22 No. 1 (123), 1979, pp 10-13

ACKNOWLEDGMENT: International Union of Railways. BD
ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

00 300614
DEFORMATIONS OF SUSPENSION BRIDGES UNDER RAILWAY LOADS [Verformungen von Haengebruecken unter Eisenbahnlasten]
The possibility of using suspension bridges for railway traffic is investigated. Owing to the great deformability of suspension bridges, on the one hand, and the small permissible incline on important railway lines, on the other, a

parametric study became mandatory. An analysis was made of suspension bridges with spans ranging from 500 to 3000 m for various sag/span ratios, various railway and traffic loads, and various temperature loads. Some examples of influence lines of the average incline and curves of maximum inclines are presented as functions of the span for all loading states. [German]

Brancaleoni, F (Rome University, Italy) *Stahlbau* Vol. 48 No. 2, Feb. 1979, pp 33-39, 9 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

00 300615
CONCRETE FOR TUNNEL LININGS
The author presents a review of the literature and discusses the application of in-situ concrete and gunite for the linings of hard rock tunnels as a combined primary and secondary lining system. In-situ concrete used as a secondary lining to cast iron and precast concrete bolted segmental primary linings is also dealt with.

Perkins, PH (Cement and Concrete Association) *Consulting Engineer* Vol. 43 No. 2, Feb. 1979, p 49, 17 Ref.

ACKNOWLEDGMENT: EI
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00 300618
CONTRACTOR'S "PIPE ENVELOPE" CUTS SUBWAY COSTS
The paper reports how by using an arch of steel pipes it was possible to build a subway tunnel in downtown Atlanta, Georgia, through an embankment without disruption by the railroad only 4 m above it.

Hancock, N *Engineering and Contract Record* Vol. 92 No. 3, Mar. 1979, p 14

ACKNOWLEDGMENT: EI
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00 300722
BRIDGE FAILURE ON THE CHICAGO TRANSIT AUTHORITY'S DAN RYAN LINE
Discovery of a crack in one of the box-girder bents supporting a CTA elevated structure over a railroad resulted in discovery of similar failures in adjacent portions of the welded steel elevated line. Temporary repairs to restore the line to service, permanent repairs and factors involved in what was initially a fatigue crack in a weld propagated by reduced fracture toughness at low temperature and stresses generated by restraints within the welded assembly are all discussed.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Koncza, L *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 392-402, 6 Fig.

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00 300723
LANDSLIDE STABILIZATION FOR TRESTLE REPLACEMENT
Stabilizaiton of a river bank adjacent to a mountain slope to allow construction of an embankment for the British Columbia Railway is described. Ground instability was due primarily to artesian groundwater pressure but there were several other factors contributing to instability. Alternative methods of stabilizing ground affected by artesian pressures are discussed; reasons for selecting the stabilization method used at this site are given.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Buck, GF Chatterji, PK (Thurber Consultants Limited, Canada);
Wakely, MS (Canadian Pacific Rail) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 408-420, 9 Fig., 1 Tab.

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00 300724
UNIQUE SOLUTION TO PROBLEM AREA IN BUILDING A NEW RAILROAD IN CANADA
Canadian Pacific is confronted with increasing the capacity of its single-track transcontinental main line through the Rockies. Four sites having grades in excess of 1 percent and identified as westbound bottlenecks are now receiving second tracks on new alignments that will permit through operation of longer trains without helper units. Problems of line location, soil stabilization and environmental impact are described for the $150 million project which will include construction of 41 miles of new line with an 8.3-mile tunnel.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Wakely, MS (Canadian Pacific Rail) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 421-427

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00 300741
DETECTION AND REPAIR OF FATIGUE DAMAGE IN WELDED HIGHWAY BRIDGES
Recently, fatigue cracking has been observed in the field at a number of different structural details. In one instance, complete fracture of a tension flange followed fatigue crack growth at the toe of a transversely welded cover plate in a 13-year-old bridge. Subsequent inspection of 15 other cover-plate ends in the same bridge revealed that the two beams adjacent to the cracked member were also cracked through about one-half the flange thickness. Smaller fatigue cracks were detected at several other cover-plate ends. This report combines the results of two studies. NCHRP Project 12-15, "Detection and Repair of Fatigue Cracking in Highway Bridges," demonstrated that either peening the weld toe or applying a gas tungsten arc remelt process can be successful in improving fatigue strength in the laboratory. Two state-of-the-art reports completed as part of this study are included in Part II of this report. Existing methods of nondestructive inspection are described in Appendix A and their reliability and adaptability for detection of fatigue cracks in welded highway bridges are evaluated. Typical existing and currently designed welded bridge details are reviewed in Appendix B and those most susceptible to fatigue crack growth are classified. NCHRP Project 12-15(2), "Retrofitting Procedures for Fatigue-Damaged Full-Scale Welded Bridge Beams", included further work on peening and the gas tungsten arc remelt process; this study also (1) demonstrated the applicability of these methods in the field, (2) provided new test data on the low stress-range behavior of full-size bridge beams, and (3) examined the fatigue strength of beams with cracks at the ends of transverse stiffeners. Recommendations based on the tests of full-size beams were used to modify the fatigue provisions of the AASHTO Standard Specifications for Highway Bridges during 1978. /Author/

Fisher, JW Hausammann, H Sullivan, MD Pense, AW (Lehigh University) *NCHRP Report* No. 206, June 1979, 85 p., Figs., Tabs., Refs., Apps.

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00 301143
TUNNEL CONSTRUCTION UNDER HISTORICAL BUILDINGS IN NUERNBERG [TUNNELBAU UNTER HISTORISCHEN GEBAEUDEN IN NUERNBERG]
In the central city area of Nurnberg an underground station was constructed using traditional techniques. This involved working underneath the "Nassau House" which was built in the 12th and 13th centuries, the soffit of the tunnel being only 2,50 M below the bottom of the foundations. Furthermore the station tunnel had to be driven only 0,80 M beside the foundation of the 75 M high south tower of the Lorenz Church (13th century). The underground station is situated in friable keuper sandstone. An additional complication was that the rock core remaining between the two tunnel tubes was only 2,80 M wide and had to accommodate three transverse passages and two access halls. The chosen method of construction, the progress of the work and the results of measurements during the work are described in detail. The settlements observed in the case of the Nassau House were only 9 mm and for the south tower of the Lorenz Church only 2 mm. The measurements showed among other things, that for such closely spaced tunnel tubes a common relieving arch is formed in the surrounding strata even for such small cover and low strength rock which serves to reduce the

loads on the tunnel lining. On the basis of the comprehensive preliminary investigations it was possible to include all the necessary work in the tender documents and to complete the work within the allotted time without exceeding the estimated costs. The relatively small settlements which occurred had no adverse effects on the valuable historic buildings. /TRRL/ [German]

This paper was presented at the Hans-Cloos Conference on Geomechanics, held 14th & 15th October, 1976, in Salzburg.

Bauernfeind, P Mueller, F (Hauptamt fuer Tiefenbauwesen, West Germany); Mueller-Salzburg, L *Rock Mechanics* Vol. SUPP 1978, pp 161-192, Fig., Tab., 2 Phot., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307778)
ORDER FROM: Springer Verlag, 175 Fifth Avenue, New York, New York, 10010

00 301144
NON-WOVEN SYNTHETIC MATERIALS-AN ALTERNATIVE TO NORMAL TUNNEL INSULATION [Kunststoffvliese-eine Alternative zur Herkoemmlichen Tunnelisolierung]
An attempt is made to determine the deformation and filter properties which are significant for the use of non-woven materials as a substitute for tunnel sealing in stretches subjected to limited water infiltration, when they are in direct contact with fresh concrete. The tests were carried out in a laboratory. Although various questions still remain unanswered, such as how the filter properties vary over a long period in the materials found in solution in the water from the rock, how far the material sustains permanent deformation in the rock and how it can thus reduce the loading on the lining, this new construction material will have a wider use because of its operational advantages. /TRRL/ [German]

Bilewicz, D *Baustofflehre-Materialpruefung* Vol. 3 1977, pp 50-53, 8 Fig., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307784)
ORDER FROM: Innsbruck University, Austria, Institut f Baustofflehre u Materialprue, Technikerstrasse 13, Innsbruck, Austria

00 301145
CANTILEVER CONSTRUCTION WITH SCAFFOLDING BEAMS-DESCRIPTION OF TECHNIQUE, EQUIPMENT AND CONSTRUCTION REPORT [Freivorbau mit Ruesttraeger-Beschreibung des Verfahrens, der Vorrichtung und Bauberichte]
The special type of cantilevering construction described which operates with the assistance of a scaffolding beam takes a special place in the field of prestressed concrete bridge construction: a straight axis, relatively light scaffolding beam makes it possible, even at great heights over valleys, to support the completed structure from one pier as far as the span centre and to construct a further bridge span in ten concreting operations. The development of a working concept and the necessary preparation for construction as well as the use of the technique in the construction of two large bridges together with descriptions of the difficulties which occurred gives an insight into the change in bridge construction in the last decade and an example of a necessary modern solution. /TRRL/ [German]

Zoubek, H *Zement und Beton* Vol. 23 No. 1, 1978, pp 8-16, 3 Fig., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-307785)
ORDER FROM: Zement und Beton, Mentergasse 3, 1070 Vienna, Austria

00 301149
THE ERECTION OF RAILWAY BRIDGES WITHOUT TRAFFIC INTERRUPTIONS [Herstellen von Eisenbahnbruecken unter Betrieb]
There are various methods of erecting railway bridges carrying permanent way with the minimum interference with rail traffic. The choice of method is based on preliminary investigations to determine the most appropriate method for each particular case. The choice of construction method is governed by operational factors, especially considerations of safety and the intensity of loading. Substructures may be constructed using diversion routes, temporary bridge structures or special foundation systems. The analogous methods for the super-structure are use of diversions, temporary bridges or lifting or sliding into position of components during breaks in the rail service. This enables large prefabricated units and even whole structures to be erected. Various examples illustrating the applications are discussed, with special emphasis on the so-called "drawer" system, which with the use of stringers to replace the sleepers allows traffic to continue virtually without interruptions. /TRRL/ [German]

Werner, W (Gruen & Bilfinger Ag)
Deutscher Beton-Verein E.V. 1976, pp 203-218, 3 Fig., 9 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-307877), 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 301150
UNDERGROUND RAILWAY CONSTRUCTION IN VIENNA [U-Bahn-bau in Wien]
On the occasion of the opening of the Vienna underground railway system, a comprehensive account is presented of all the associated problems and their solutions. These include the questions of planning, project planning, legal aspects, construction methods, financing, design, geodesy, geotechnology, the construction process, air conditioning, installation work, lifts and escalators, the operation, alignment and superstructure work, the electrical equipment, safety and parking of vehicles. [German]

Aufbau Vol. 33 No. 1-3, 1978, 120 p., Figs., Tabs., Phots., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-307793)
ORDER FROM: Verlag fuer Jugend und Volk, Tiefer Graben 7, A-1014 Vienna, Austria

00 301165
INFORMATION OBTAINED FROM PREPARING AND CARRYING OUT COMPLEX TRACK CONSTRUCTION AND UNDERGROUND WORK [Erkenntnisse aus der Vorbereitung und Durchfuehrung von komplexen Gleisbau-und Tiefbaumassnahmen]
The high importance of drainage works on the railway infrastructure makes it necessary to use the optimum alternatives that are desirable and of high quality, among the technical solutions available. To increase the load-bearing strength of the infrastructure, the use of a protective layer of small gravel and a layer of PVC-H mesh have proved effective for drainage installations. [German]

Darr, E Pommeranz, H *Signal und Schiene* Vol. 23 No. 1, Jan. 1979, pp 5-9, 3 Fig., 7 Tab., 5 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13/14, Postfach 1235, 108 Berlin, East Germany

00 301170
EXPERIENCE GAINED WHEN IMPROVING THE CLEARANCE IN THE SCHWARZKOPF TUNNEL [Erfahrungen bei der Profilfreimachung des Schwarzkopftunnels]
No Abstract. [German]

Beiche, H *Eisenbahntechnische Rundschau* Vol. 28 No. 3, Mar. 1979, pp 189-194, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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00 301320
THE DESIGN OF LIGHT-RAIL TRACK IN PAVEMENT
Many existing light-rail transit (LRT) networks and parts of some new ones require the construction of track in pavement. Sometimes this track is intended for joint use with street traffic or buses; in other places paved track is used in pedestrian areas or on medians. This paper describes the types of LRT track used in pavement in North America and Europe and suggests that the standards now in use in the United States may be in need of revision. There has been very little construction of LRT track in pavement in North America in the last 40 years. What little has been built has followed the traditional standards of the industry, which date from the earliest streetcar days, and has generally used girder rail, ties, and ballast set in concrete pavement. By contrast, most European LRT systems have adopted a basically different type of track for use in pavement. It is built without conventional ties and is mechanically separated from the street pavement structure. Such track is quieter and may also be less costly; it appears to warrant serious consideration for new U.S. installations. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Fox, GD (De Leuw, Cather and Company) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 130-136, 11 Fig., 4 Ref.

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00 301415
DEVELOPMENT OF THE "TRACK-ON-PILLAR" TECHNIQUE FOR NEW DB LINES [Entwicklung der "aufgestaenderten Fahrbahnen" fuer Neubaustrecken der Deutschen Bundesbahn]
The "track-on-pillar" technique is used extensively when planning new lines. The article describes the concept and development of this type of structure, using the example of a completed bridge and of one under construction. [German]

Jahns, G Beinlich, M *Die Bundesbahn* Vol. 55 No. 6, June 1979, pp 427-432, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

00 301419
IMPROVING THE QUALITY OF TRACK BED CONSTRUCTION [Povysit' vnimanie k kacestvu stroitel'stva zemljanogo polotna]
No Abstract. [Russian]

Hvostik, IF Dudaev, AA *Transportnoye Stroitel'stvo* No. 6, June 1979, pp 4-7, 2 Phot.

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

00 301423
A RAIL BRIDGE WITH A 120 M SPAN [Pont-rails de 120 m de portee]
In October 1977, the Simplon Line was cut as the result of a violent storm. Near Verbania-Pallanza, Italy, one of the two piers of the double-track bridge crossing the Toce was destroyed. A prefabricated SKB (Schaper-Krupp-Bundesbahn) bridge was placed at the FS's disposal by the DB, and was erected in four successive stages. [French]

Koch, KF Sautter, J *Acier/Stahl/Steel* No. 2, 1979, pp 69-73, 5 Phot., 7 Ref.

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

DOTL JC

00 301429
RENOVATION OF RAILWAY TUNNELS: METHODS OF ULTRASONIC EXAMINATION AND STRENGTHENING [Renovation des tunnels ferroviaires: methodes d'ausultation et de confortement]
With its 1,400 tunnels (representing 550 km of underground lines), more than half of which are over a hundred years old, the SNCF has a vast experience in maintenance and renovation of this type of structure. The study summarises the results of this experience and deals with the following points in particular: changes in tunnels over periods of time; organization of inspection; methods of ultrasonic examination; special conditions for taking action; methods used in strengthening projects; and present trends in renovation methods. [French]

Chambron, E Picquand, J-L *Annales de l'Institut Tech du Batiment Travaux Pub* Vol. N No. 73, June 1979, pp 1-24, 38 Phot.

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

00 301434
TUNNELLING UNDER DIFFICULT CONDITIONS. PROCEEDINGS OF INTERNATIONAL TUNNEL SYMPOSIUM, TOKYO, 1978
No Abstract.

Pergamon Press, Incorporated SNCF Cat 53 N47, 1979, 406 p., Tabs., Phots., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Pergamon Press, Incorporated, Headington Hill Hall, Oxford OX3 0BW, England

00 301443
ANALYTICAL TESTS OF ICICLE PREVENTION WORK BY ADIABATIC TREATMENT OF TUNNEL SURFACE IN VERY COLD AREA
Prevention of icicles in tunnels by installing thermal insulation was examined in a very cold area of Hokkaido. Tunnel lining surface could be kept higher than 1 deg C although ambient in the tunnel reached minus 20 deg C. Quantity of heat, conductivity, freezing depth and temperature change were observed for more than a year. Thermal analysis determined the thickness of thermal insulating material to inhibit icicle formation.

Okada, K Kawaguti, T Gotoh, I *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 65-69, 12 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

00 301459
CHEMICAL COMPACTION AIDS FOR FINE-GRAINED SOILS, VOLUME I
Soil is man's cheapest and most abundant construction material, and compaction is the most widely used method of strengthening soils and making them suitable for construction uses. The technology of compaction, while improving, remains largely in a trial and error state, emphasizing the basic moisture-density relationships discovered by R.R. Proctor. In recent years, the trial-and-error approach has led to the introduction of proprietary trace chemical additives that are said to increase soil densification and ease of compaction, and that improve strength and stability qualities, particularly of fine-grained soils. The report contained herein (Volume I of a two-volume report) includes the principal objectives of Phase I of the total project, i.e., an extensive review of appropriate subject literature and a pilot laboratory moisture-density-strength study of twenty chemicals with eight soils of varying origin and mineralogy. Also included in this report are a theoretical discussion of possible mechanisms of chemical compaction aids, properties of the twenty-six soils used in the total investigation (Phase I and Phase II), and data from supplemental tests designed to improve our understanding of the influences of the chemicals on fine-grained soils.
Sponsored by Federal Highway Administration.

Hoover, JM Handy, RL
Iowa State University, Ames, Federal Highway Administration Final Rpt. FHWA-RD-79- 63, June 1978, 158 p.
SPONSORING AGENCY:
RESPONSIBLE INDIVIDUAL: Fohs, DG

Contract DOT-FH-11-8135

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PB-301115/2ST

00 301721
EVALUATION OF THE RAILWAY NETWORK USING AN AGA 710 TACHOMETER AS A BASIS FOR COMPOSING PHOTOGRAMMETRIC PLANS AND FOR HIGH-PRECISION DETERMINATION OF POINTS IN THE CONTEXT OF THE DB'S PLANS FOR NEW LINE PROJECTS [Netzbestimmung mit elektronischem Tachymeter AGA 710 als Grundlage fuer die photogrammetrische Planherstellung und Punktbestimmung hoher Genauigkeit im Rahmen der Neubaustreckenplanung der Deutschen Bundesbahn.]
No Abstract. [German]

Craemer, H Kloethe, K *Vermessungswesen und Raumordnung* Vol. 41 No. 3, 1979, pp 150-160, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Duemmlers Verlag, Kaiserstrasse 31-37, 5300 Bonn 1, West Germany

00 301810
PERFORMACE OF FROST HEAVE MODIFYING CHEMICAL ADDITIVES AT THE CN DORVAL TEST SITE
An investigation conducted during the period July 1977 to June 1978 to study the performance of frost heave reducing chemicals applied to the surface of sections on a 1500 foot railroad spur track in Dorval, Quebec, is reported. Three salts were initially applied to the ballast surface in granular form and allowed to infiltrate into the subgrade by rainfall and natural

leaching. Second stage treatment involved chemicals to form void plugging precipitates in the soil profile to control the rate of migration of the salts. The track site was instrumented in order to evaluate the effectiveness of the two-stage treatment in the long term alleviation of frost heaving problems in railway track structure. The field study is an extension of a laboratory research program initiated in 1972 on the Alleviation of Detrimental Frost Heaving with Salt Additives most recently reported in TP 1408 in January 1978.

Sheeran, DE Yong, RN
McGill University, Canada, Transport Canada Research and Development Centre, Canadian National Railways Tech Rpt. FHTD-VIII, TP 1814, Oct. 1978, 88 p., Figs., Tabs.

Contract OSS77-09013

ORDER FROM: Transport Canada Research and Development Centre, 1000 Sherbrooke Street, West, P.O. Box 549, Montreal, Quebec H3A 2R3, Canada

00 301819
TIMBER BRIDGES--INSPECTION PRIMER
Procedures for inspecting timber bridges and the reasons for such inspection are described. Conditions of the site surrounding the bridge, as well as the actual condition of the bridge members must be reported. Wood decay and methods of appraising its effect are discussed.

Fish, A (Timbricon Services, Incorporated) *Railway Track and Structures* Vol. 75 No. 9, Sept. 1979, pp 48-49, 2 Fig.

ORDER FROM: ESL

DOTL JC

00 301825
STRUCTURAL DETAILS AND BRIDGE PERFORMANCE
Examples observed in a group of about 4,000 steel, concrete and timber bridges illustrate maintenance problems caused by unsatisfactory details or by incorrect evaluation of the environment. Corrective measures and improved detailing and construction practices are suggested. Cracking in steel members occurred where high secondary stresses resulted from unequal loading of members connected in parallel, at stress raisers, and as a result of antiplane shear or of localized bending in a plane normal to the element plane at locations where deformation was concentrated by variations in stiffness of the load path. In most cases, fatigue was involved. Deterioration of all materials was caused by details that trap water, retard evaporation, or allow replacement of evaporated moisture. Extensive general deterioration of steel occurred in a chemically aggressive environment with only a light accumulation of rust and little pitting. Some details that caused maintenance problems obviously facilitated erection or were used to avoid conditions prohibited by design specifications.

Byers, WG (West Lines, Atchison, Topeka, & Santa Fe Railw Co) *ASCE Journal of the Structural Division* Vol. 105 No. 7, July 1979, p 1393, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

00 301829
REINFORCED EARTH SPEEDS SURFACE MINE CONSTRUCTION
A simple construction system that derives its internal stability from galvanized steel or aluminum straps buried in backfill is finding mine applications, ranging from rock crusher headwalls to massive slot coal storage facilities. Reinforced earth is 20-50 per cent less expensive than alternative earth embankment structures and, compared with cast-in-place concrete walls, six to seven times faster to erect. While the majority of applications are in civil engineering--projects such as retaining walls, bridge abutments, slide buttresses and containment dikes--a growing proportion is mine-related.

Australian Mining Vol. 71 No. 2, Feb. 1979, pp 226-229

ACKNOWLEDGMENT: EI
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00 301834
EARTHQUAKE STABILITY OF ROCK TUNNELS
The article describes a study in which rock tunnel response to earthquake motion is compared with calculated peak ground motions in 71 cases to determine damage modes and indices. Damage ranging from cracking to closure occurred in 41 of the cases observed. No damage was observed below calculated surface accelerations of 0.2 g. The first part of the paper describes the characteristics of the rock tunnels investigated while the second part assesses the shortcomings of such a statistical damage study. A critical assessment of the study is used to establish research necessary to develop analytical approaches. /TRRL/

Dowding, CH (Northwestern University, Evanston) *Tunnels and Tunnelling* Vol. 11 No. 5, June 1979, pp 15-20, 8 Fig., 15 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241538)
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DOTL JC

00 301835
THE GEOTECHNICAL USE OF FILTER FABRICS IN HIGHWAY CONSTRUCTION
The principal objective of this study is to assist staff in designing and installing filter fabrics for purposes of drainage, erosion control, soil reinforcement, wash-out and scour protection etc. This objective was believed to be best accomplished by developing design guidelines for the use of fabrics and by disseminating information pertaining to the various possible applications of synthetic filters. /TRRL/

Barsvary, AK Korgemagi, P
Ontario Ministry of Transportation & Communic, Can Monograph Feb. 1979, 60 p., 26 Fig., 2 Tab., 15 Phot., 35 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241550), Roads and Transportation Association of Canada
ORDER FROM: Ontario Ministry of Transportation & Communic, Can, 1201 Wilson Avenue, Downsview, Ontario M3M 1J8, Canada

00 301837
PERMEABLE SYNTHETIC FABRIC MEMBRANES. 2. FACTORS AFFECTING THEIR CHOICE AND CONTROL IN GEOTECHNICS
The article aims to review the current situation in the rapidly developing field of the use of permeable synthetic fabric membranes in conjunction with soils in many types of civil engineering works. The author sets out to present to the practising engineer information which should be considered before undertaking works including fabrics. The types of fibre are described together with the types of fabric and choice of fabric type. A table lists details of various natural and synthetic fibres. (mechanical properties, resistance to attack and availability in various types of fabric construction). Various fabric strength tests which can be carried out are described with the aid of diagrams in tabular form. Stress-strain relations of different woven fabrics are shown graphically. The need to standardise the strength tests for fabrics in civil engineering use is stressed though it is acknowledged that no one test can be adequate to fully specify and control all the various strength properties required. /TRRL/
See also RRIS 00 184597; Bulletin 7901.

Hoare, DJ (Birmingham University, England) *Ground Engineering* Vol. 11 No. 8, Nov. 1978, p 25, 9 Fig., 3 Tab., 1 Phot., 21 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241288)
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DOTL JC

00 301838
NATM PROVES ITS ADAPTABILITY
The article summarizes the New Austrian Tunnelling Method (NATM) which has been successfully used in many deep alpine rock tunnels also in German underground railway construction. Rock bolts and grouting compound the surrounding mass forming an integral structure independent of a lining. Tunnelling takes place in increments of complete rings of sprayed concrete forming a tabular shell of predictable strength. Steel arches and wire mesh reinforcement can be used to strengthen the concrete layer. Short and long anchors can be added to the support system to control instability. Instability at the face is predictable if pressure changes and actual movements are monitored. Tunnel geometry is monitored by convergence measurements. Illustrations are given of how the method can be used to excavate very large tunnel sections in caverns by dividing operations into manageable working stages.

New Civil Engineer Tunnelling Supplement, (0307-7683) Mar. 1979, pp 22-23, 1 Fig., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 241331)
ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

00 301839
ADAPTING CUT AND COVER TO SOFT GROUND CONDITIONS
A novel variant of the cut and cover method has been devised. The proposed system, described in the article, would be particularly suited to soft ground in congested cities. Precast and in situ structural elements are placed in an alternative sequence in trenches excavated perpendicular to the line of the tunnel. It is suggested that appreciable savings could be made by using concrete as the principal structural element. The need for diaphragm walls is eliminated; ground movements are minimised and a rigid structural lining obtained. Because the excavation is carried out in strips, temporary diversion of utility services need only be over a short distance and for a short period. Details are given for the sequence of operations that could be used to build a 5 M diameter tunnel 10 M deep is soft clay. /TRRL/
Taken from New Civil Engineer Tunnelling Supplement.

Nazir, CP
Institution of Civil Engineers, (0307-7683) Mar. 1979, pp 25-27, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 241332)
ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

00 301840
NONLINEAR STATIC ANALYSIS OF CABLE-STAYED BRIDGE STRUCTURES
The nonlinear static analysis of plane cable-stayed bridge structures is discussed. A FORTRAN computer program is presented which will analyze a plane cable-stayed bridge structure considering the effect of initial cable tensions, member dead weights, and distributed and concentrated live loads. The output from the program consists of joint displacements, member stress resultants and support reactions. /TRRL/

Fleming, JF (Pittsburgh University, Pittsburgh) *Computers and Structures* Vol. 10 No. 4, Aug. 1979, pp 621-635, 4 Fig., 10 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241335)
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00 301847
BRIDGE SLIDE PUT TO THE TEST
Difficulties in sliding a 1000 t, 100 M long concrete railway bridge into an embankment near Canterbury are discussed. The structure had been moved only 5 M of its projected 13 M first slide to half-way temporary supports when stainless steel plates on the slide-in beams racked and the skid assembly seized. The fixed base central portal frame was designed to be moved with the bridge deck. Four large stressing jacks were placed against sledges which were supported on twin-webbed 2 M by 1 M plate girders. Friction between the skid and the top of the beams increased as the slide progressed and new wider skids had to be made quickly when the slide was halted over the railway line. Steering the bridge deck also presented problems; lateral restraint was required during the slide.

Heayes, N Heywood, P *Contract Journal* Vol. 289 No. 5201, May 1979, pp 30-31, 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 241518)
ORDER FROM: IPC Building and Contract Journals, Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ, England

00 302136
TUNNEL DESIGN: PHILOSOPHY AND PRACTICE
Use of underground space is increasing rapidly, and many young designers are becoming involved, for the first time, with sub-surface tunnelled works. This paper draws attention to the unusually close relationship in tunnelling that exists between temporary and permanent works, noting particularly that the former cannot usually be reclaimed and often, for reasons of space or economy, have to be incorporated within the premanent structure. The temporary support must therefore be compatible with the permanent works. Design is generally carried out using empirical rules, based on previous experience and taking account of safety both in the tunnel and of adjacent property. Permanent works design, by careful attention to form, can benefit from the underground environment, while recognizing the problems inherent in the difficult working conditions. The choice of materials is largely dictated by their durability in order to limit maintenance to a minimum during the life of the structure.

Hulme, TW *Structural Engineer* Vol. 57A No. 5, May 1979, pp 147-152

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

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00 302184
FIGHTING TRAFFIC PARALYSIS IN MEXICO CITY
The Federal District of the City moves to double its mass transit system by adding new lines to its metro system are discussed. City's soil conditions called for special techniques to be applied in building the underground portions of the floating subway. The underground sections of the Metro are being built using the cut-and-cover technique. The first step in the actual building of the cut-and-cover tunnel was to construct diaphragm walls at each side of the right of way.

World Construction Vol. 32 No. 6, June 1979, p 62

ACKNOWLEDGMENT: EI
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00 302327
TUNNEL MAINTENANCE AT THE SNCF [La maintenance des tunnels a la SNCF]
Reminder of damage occurring during aging of tunnels. Monitoring and inspection operations. Specific working conditions in railway tunnels. Current maintenance and various repair methods. Renovation of the Givors tunnel; work planning and implementation. [French]

Chambron, E *Tunnels et Ouvrages Souterrains* No. 34, July 1979, pp 201-213, 28 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

00 302328
MAINTENANCE OF TUNNELS IN PARIS: UNDERGROUND AND REGIONAL EXPRESS SYSTEMS [L'entretien des ouvrages souterrains du reseau de Paris, metro et RER]
Concrete or masonry tunnels; survey of construction technique; types of damage; monitoring, inspection and maintenance. Sunken tunnels with metal cover: main characteristics and ageing; monitoring and maintenance. [French]

Dutems, C Dumont, O *Tunnels et Ouvrages Souterrains* No. 34, July 1979, pp 215-223, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

00 302364
REINFORCED EARTH ITS DESIGN AND CONSTRUCTION
Reinforced earth, a method of building retaining structures with a facing material secured by reinforcing strips that run through granular backfill, is finding application in railway engineering. Basic design principles and examples of construction for railroads on shores of waterways, as cut retention and for bridge supports are given.
Proceedings of the Eighty-Third Annual Convention of the American Railway Bridge & Building Association held September 18-20, 1978, Chicago, Illinois.

Elias, V (Reinforced Earth Company)
American Railway Bridge & Building Association Proceeding Vol.83, 1978, pp 46-52, 7 Fig.

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

00 302372
LANDSLIDES AND OTHER MASS MOVEMENTS-INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY SYMPOSIUM [Glissements et autres mouvements de terrain-symposium de l'association internationale de geologie de l'ingenieur- Prague-15-16 septembre 1977]
This number is devoted entirely to the symposium. It presents the symposium papers on the following four topics: (1) systematic mapping and

recording of ground movement- estimation of risk of slips-influence of geological and climatic conditions on slope failure-methods for recording ground movement and their economic importance; (2) deep gravitational deformation of mountain slopes-relations between tectonic deformation and gravity-technical and economic importance for engineering structures; (3) evaluation of the effectiveness of stabilisation measures relative to general conditions and types of ground movement -experience gained in stabilisation; (4) modern methods for investigating ground movements-in situ measurement of deformations, engineering properties of rock and rock mass tensile stress-determination of residual shear strength in failure zones-model tests. (TRRL) [French]

Bulletin de l'Assoc Int'l Geologie de l'Ingenieur Monograph No. 16, Dec. 1977, 256 p., Figs., Tabs., Phots., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 107727), Central Laboratory of Bridges & Highways, France
ORDER FROM: Association Int'l de Geologie de l'Ingenieur, Geologisches Landesamt NW, De Greiff-strasse 195, Krefeld 1, West Germany

00 302373
DIRECTIVES FOR SITE INVESTIGATION, THE ANALYSIS OF PROJECTS AND THE EXPLOITATION OF AGGREGATES IN TEMPORARY QUARRIES WITH A VIEW TO THEIR USE IN THE CONSTRUCTION OF HIGHWAYS AND RAILWAYS (VSN 182-74) [Tekhnicheskie ukazaniya po izyskaniyam proektirovaniyu i razrabotke pritrassovykh karerov dliya zheleznodorozhnogo i avtodozhnogo stroitel'stva (VSN 182-74)]
This study comprises a section devoted to prospecting and to planning (general topics, technico-economic justification, brief and detailed site investigations, sampling, estimation of resources, design of quarries) and a section dealing with the extraction and the preparation of aggregates (general, open cut work, transport and handling, excavation, manufacture, slags, surveillance of fabrication). (TRRL) [Russian]

Orgtransstroj Mintransstroj Monograph VSN 182-74, 1975, 296 p., 53 Fig., 93 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 107669), Central Laboratory of Bridges & Highways, France
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

2BA(URSS)

00 302376
MODEL STUDY OF RIB-IN-ROC PRE-REINFORCEMENT FOR LARGE UNDERGROUND OPENINGS
The objective of the research described in this report is to develop a fundamental understanding of the rib-in-roc method and of the mechanisms involved and its quantitative contribution to permanent as well as to immediate stabilization of a large underground opening. This is the final report of a two and a half year research program carried out at the University of Luleaa, Department of Rock Mechanics. This report presents a physical model study on the effectiveness of the rib-in-roc method for the stabilizing of large underground openings. In this study the approach to the dimensional analysis and the use of it is slightly different from previous works. A stress has been put upon pi-numbers in the dimensional analysis such that more information is exploited than is usual in rock model studies. An effort has also been made to synthesize all previous and current notions towards the creation of a practical working system of the so called rib-in-roc method. (TRRL)

Stillborg, B Stephansson, O
Luleaa Hoegskola Res Rpt. Tulea 1978:07, 1978, 128 p., Figs., 8 Tab., Phots., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 241778), National Swedish Road & Traffic Research Institute
ORDER FROM: Luleaa Hoegskola, Avdelningen foer Bergteknik, Luleaa, Sweden

P2575:78- 07

00 302381
APPLICATION OF THE SLURRY TRENCH WALL TECHNIQUE DURING THE CONSTRUCTION OF THE UNDERGROUND RAILWAY IN MOSCOW [Primenenie sposoba "stena v grunte" na stroitel'stve moskovskogo metropolitena]
This article describes the construction of two reinforced concrete walls 110 M long, 11 M high and 0,6 M wide by means of skips designed by NIIOSP. The experimental site was in an urban environment; the soils were saturated sand silt, sand, gravel, rounded pebbles, large blocks and dense clay. The work continued in the summer, autumn and winter. The slurry trench walls built are used as retaining walls and waterproofing walls beyond which the tunnels are being built. The latter will then be covered up. The walls will also protect buildings against noise and vibrations caused by trains. [Russian]

Garazha, BM Fedorov, BS Smorodinov, MI *Soil Mechanics and Foundation Engineering* No. 2, 1977, pp 7-10, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 108446), Central Laboratory of Bridges & Highways, France
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

00 302385
THE JUBILEE LINE. 3. CONSTRUCTION FROM BOND STREET STATION TO ADMIRALTY ARCH
Constructed as a section of London's Jubilee Line underground railway, a description is given of the station construction at Bond Street and Green Park. The article also describes the running tunnel drives between Bond Street Station and Admiralty Arch with the associated auxiliary works. Construction aspects of the tunnel works are described in detail.

Bubbers, BL (Mott, Hay & Anderson) *Institution of Civil Engineers, Proceedings* Vol. 66 No. PT1, Aug. 1979, pp 395-406, 5 Fig., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242230)
ORDER FROM: ESL

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00 302386
THE JUBILEE LINE. 2. CONSTRUCTION FROM BAKER STREET TO BOND STREET EXCLUSIVE AND FROM ADMIRALTY ARCH TO ALDWYCH
Forming part of London's Jubilee Line underground railway, a description is given of the design and construction of the running tunnels, step-plate junctions and crossover tunnel between Baker Street and Bond Street, Admiralty Arch and Aldwych, and Baker Street and Charing Cross stations. Tunnel construction and design are detailed as well as the problems associated with keeping stations operational while work was carried out.

Lyons, AC (Halcrow (Sir William) and Partners) *Institution of Civil Engineers, Proceedings* Vol. 66 No. PT1, Aug. 1979, pp 375-394, 13 Fig., 3 Tab., 9 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242229)
ORDER FROM: ESL

DOTL JC

00 302387
THE JUBILEE LINE. 1. THE PROJECT
The article describes the purpose and layout of London's Jubilee Line underground railway and includes details of the design and construction of surface works. These include a new train servicing depot for the Bakerloo Line made necessary by the use of existing facilities by Jubilee Line rolling stock. Features of the finishes and equipment for the stations and tunnels are described. The article also includes a summary of costs.

Cuthbert, EW (London Transport Executive) *Institution of Civil Engineers, Proceedings* Vol. 66 No. PT1, Aug. 1979, pp 359-374, 7 Fig., 3 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242228)
ORDER FROM: ESL

00 302702
RAILWAY-BRIDGE IMPACT: SIMPLIFIED TRAIN AND BRIDGE MODEL
A lumped mass model of a railway bridge is developed where only the vertical degree-of-freedom for each joint is considered. The vehicle system is idealized as a three degree-of-freedom model of a railway vehicle consisting of the carbody and wheel-axle sets. Dynamic interaction equations for the bridge-vehicle system are derived and solved using the numerical integration method. Impact factors for member forces and nodal deflections are generated under the action of a single or a series of three moving vehicles. Impact factors are compared with AREA specifications for truss and girder bridges.

Chu, KH (Illinois Institute of Technology); Garg, VK Dhar, CL *ASCE Journal of the Structural Division* Vol. 105 No. 9, Sept. 1979, p 1823, 17 Ref.

ACKNOWLEDGMENT: EI
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00 303171
BORING OF SUBMARINE TUNNEL
An experimental submarine tunnel was drilled to study the problems dealt with construction of the great Seikan tunnel connecting islands Honshu and Hokkaido in Japan. Discussed are the method of horizontal boring under the sea bottom, drilling bits and double-pipe stabilizers used for fast boring, performance of boring machines, methods of water injection and cement spraying, reverse circulation boring and other advanced technologies. [Japanese]

Yokoyama, A *Japan Society of Civil Engineers, Journal of* Vol. 64 No. 1, Jan. 1979, pp 91-98

ACKNOWLEDGMENT: EI
ORDER FROM: Japan Society of Civil Engineers, 1-chome, Yotsuya, Shinjuku-ku, Tokyo 160, Japan

00 303173
CONSTRUCTION OF A SUBWAY STATION WITH LOW COVER [Bergmaennische Auffahrung eines U-Banhofes unter Geringer Ueberdeckung]
This article describes how a 600-m-long part of the Bochum, West Germany, subway station was built by tunneling in 1975 and 1976. In addition to the subway station, one-track and two-track tubes had to be constructed with the height of the cover ranging between 8 m and 3 m. Tunneling was executed based on the principles of the "New Austrian Tunneling Method". [German]

Laue, G Will, M *Rock Mechanics, Felsmechanik, Mecanique des Roches* Vol. 11 No. 2, Sept. 1978, pp 107-121, 5 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

00 303186
SUNKEN TUBE TUNNEL SEGMENTS ARE CAST BY ROLLING FORMS
Construction of a rail tunnel under Hong Kong's Victoria Harbor consisting of large concrete sunken tube segments cast by rolling forms is described. The 4,600-ft, double-track tunnel is part of the colony's first 9.7-mile transit line, linking Hong Kong Island with the Kowloon Peninsula. Methods of segmental casting, formwork arrays and controlled sinking are discussed.

Engineering News-Record Vol. 202 No. 17, Apr. 1979, pp 22-23

ACKNOWLEDGMENT: EI
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00 303578
DYNAMIC RESPONSE OF CONCRETE RAILWAY BRIDGES
The dynamic load factor of concrete railroad bridges when subjected to trains moving at various speeds is investigated. The theoretical study includes effects of speed, wheel loads, axle spacing, span lengths, bearing pads, bridge weight and track modulus. Data from 23 existing single-span bridges was used to develop dynamic characteristics. Results indicate that dynamic load factor is not simply a function of live load, dead load, train speed or span length, but a function of the dynamic characteristics of both bridge and loading. While calculated dynamic load factors compare favorably with field data of prestressed concrete bridges obtained by AAR, there is little correlation between results of this study and AREA recommendations for impact factor on such structures.

Venuti, WJ Huebsch, FJ (San Jose State University) *AREA Bulletin* Vol. 81 No. 674, Sept. 1979, pp 31-53, 9 Fig., 4 Tabs., 10 Ref.

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00 303591
SYSTEMS AND PRACTICES FOR RAPID TRANSIT TUNNELLING
This paper examines various systems and practices for rapid transit tunnelling, with special emphasis on European practice. Several underground construction methods are studied, which include grouting in soil, grouting in rock, ground freezing, cast in situ walls, prefabricated walls, secant piles, and the new Austrian tunnelling method as applied to soft ground conditions. The organizations of several European metro authorities are discussed. Tunnelling practice in the United Kingdom is studied and used as a focal point for examining such issues as the apportionment of risk under contract and the resolution of contract disagreements. The economics of underground construction are examined, and tunnelling costs associated with six European metro systems are summarized. Where appropriate, the construction costs are itemized and the cost structures are viewed in the light of the ground conditions and construction methods used. Comparisons are made between urban tunnelling practice for rapid transit in the us and Europe. Recommendations for improving tunnelling practice are offered.

O'Rourke, TD (Cornell University) *Underground Space* Vol. 4 No. 1, July 1979, pp 33-44, 6 Fig., 1 Tab., 1 Phot., 20 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 243237)
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

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00 303596
GEOTECHNICAL PERFORMANCE OF A TUNNEL IN TILL
Two parallel tunnels were built in 1976 as part of the first phase of the Edmonton rapid transit system. The tunnels, approximately 250 M long, 6 M in diameter, and having centres 11 M apart have been driven in downtown Edmonton with an average of 7.5 M overburden above the crown. The tunnels were located entirely within a dense, jointed till sequence of Wisconsin age. Two finite element analyses were performed. One predicted surface settlements and the other predicted lining stresses. The settlements predicted for a single tunnel agreed closely with observed values but the observed amount was considerably more than predicted for both tunnels. The reasons for this are suggested as being due to a cross tunnel connecting the two main tunnels and to a decrease in stiffness of the soil mass brought about by the moling of the first tunnel. In situ assessment of stresses in the ribs was not successful due largely to the fact that the ribs were not expanded entirely against the soil. Thus comparisons with predicted values could not be made and values of the earth pressure at rest could not be established. Rib deformations were essentially complete within a few days thus confirming the essentially time-independent character of the deformational behaviour of the till.

Eisenstein, Z Thomson, S (Alberta University, Canada) *Canadian Geotechnical Journal* Vol. 15 No. 3, Aug. 1978, pp 332-345

ACKNOWLEDGMENT: TRRL (IRRD 242582), Roads and Transportation Association of Canada
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00 303637
DEVELOPMENT OF ACCIDENT DETECTION TECHNIQUES. RESEARCH REPORT ON MEASURES AGAINST ROCK FALL
No Abstract.
Also covered in Issue No. 79-80 pages 55-111.

Permanent Way No. 77-78, Mar. 1979, pp 1-54, Figs., Tabs., Phots.

ACKNOWLEDGMENT: International Union of Railways, BD
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00 303646
ARCHES GIVE OPEN LOOK TO WASHINGTON METRO STATIONS
One of the early decisions in the planning for the Metro system was a design for the 53 underground passenger stations which is artistically pleasing as well as functional. The stations are semicircular in cross section, having very low sidewalls joined by a wide expanse of arch. Both sidewalls and arch feature a pattern of recessed coffers which become increasingly deep toward the center of the arch. The design eliminates the need for central pillars and roof supports, and provides the station with an open look which is unusual for underground construction. Blaw-Knox Equipment, which has supplied forms for 16 of the 19 stations built to date, approached the problem of forming by scaling up their tunnel-forming methods to match the size of the stations. Forming methods developed to overcome these problems have not only been economically successful, they have helped the construction crews stay on schedule.

Tunnels and Tunnelling Vol. 11 No. 6, July 1979, pp 76-78

ACKNOWLEDGMENT: EI
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DOTL JC

00 303647
ROME METRO: DRIVING A NEW LINE UNDER AN ANCIENT CITY
The article discusses civil works construction and tunneling for the most recent section of the city's newest underground line. It traces the development of the Roman Metro to the present day, geological conditions through which the work progressed, tunneling methods and equipment, tunnel lining, station construction, ventilation system, and other aspects of the work.

Harding, PG *Tunnels and Tunnelling* Vol. 11 No. 6, July 1979, pp 13-18

ACKNOWLEDGMENT: EI
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DOTL JC

00 303648
MUCKING OUT--SOME EQUIPMENT YOU COULD USE
Getting the muck out of a tunnel calls for organization and efficiency--whether the bore is large or small. A careless spoil removal operation brings nothing but trouble for the tunneller, retarding advance rates, pushing up costs and wasting valuable manpower. There are many ways of doing the job and a variety of equipment to consider for efficient, economical operations. This article discusses some currently available equipment that has proved effective on part projects.

Harding, PG *Tunnels and Tunnelling* Vol. 11 No. 4, May 1979, pp 63-68

ACKNOWLEDGMENT: EI
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DOTL JC

00 303665
SHOTCRETE: STRUCTURAL TESTING OF THIN LINERS
This report presents the results of engineering studies related to the development of new and improved tunnel support systems. Thin shotcrete layers were studied to assess their capacity and behavior as temporary tunnel supports. The design, construction, and operation of a large-scale test facility simulating a planar tunnel roof with a punching block 2 ft x 2 ft (60.8 cm x 60.8 cm) are described. Preliminary tests were conducted using thin mortar layers to assess the performance of the test device and the principal variables controlling the capacity of the thin liner. Results obtained from these tests were used in the planning and evaluating of the shotcrete test program. This report describes the development of the test-device, the equipment, and its arrangement and the shotcrete used in the model. The capacity of shotcrete layers for different thickness and strength of shotcrete and shotcrete-rock bond was determined.

Fernandez-Delgado, G Mahar, J Cording, EJ
Illinois University, Urbana, Federal Railroad Administration Final Rpt. FRA/ORD-75/91, UILU-ENG-75-2015, Aug. 1975, 220 p.

Contract DOT-FR-30022

ACKNOWLEDGMENT: NTIS
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PB-252669/7SL, DOTL NTIS

00 303666
CONCRETE TUNNEL LINERS: STRUCTURAL TESTING OF SEGMENTED LINERS
Tests of three circular segmented steel-fiber-reinforced concrete tunnel liners are described. They were 10 ft outside diameter and loaded with hydraulic rams in a manner that approximates a ground loading. There were six segments and a key in each ring and the segments were ribbed to allow bolting them together. Two tests were on single rings of segments and the third was on 3 rings bolted together. A series of beams that were designed to fail in shear and made of steel-fiber-reinforced concrete were tested. The results are used to develop a means for predicting shear strength of liner segments subjected to moment and thrust as well as shear. Segment joints similar to those used in the liner tests were subjected to eccentrically applied thrust in a testing machine so that thrust and moment were present in varying combinations at the joint. These joints were also cast of steel-fiber-reinforced concrete, and methods are presented to calculate their strength. These methods are then compared with the test results.
See also PB-252935.

Paul, S Sinnamon, GK
Illinois University, Urbana, Federal Railroad Administration Final Rpt. FRA/ORD-75-93, UILU-ENG-75-2013, Aug. 1975, 173 p.

Contract DOT-FR-30022

ACKNOWLEDGMENT: NTIS
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PB-252934/5SL, DOTL NTIS

00 303667
GROUND STABILIZATION: REVIEW OF GROUTING AND FREEZING TECHNIQUES FOR UNDERGROUND OPENINGS
The ground stabilization techniques of grouting and artificial freezing are reviewed. General grouting considerations are discussed including selection of grouts and techniques of injection. Materials for both particulate and chemical grouts are described along with their influence on ground properties and advantages and disadvantages. Artificial ground freezing is discussed in terms of techniques of freezing, strength-deformation and thermal considerations, and advantages and disadvantages. Selected case histories which illustrate the application of grouting and freezing to tunnel and shaft construction are briefly summarized.

Lenzini, PA Bruss, B
Illinois University, Urbana, Federal Railroad Administration Final Rpt. FRA/ORD-75-95, UILU-ENG-75-2017, Aug. 1975, 87 p.

Contract DOT-FR-30022

ACKNOWLEDGMENT: NTIS
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PB-253142/4SL, DOTL NTIS

00 303864
CP RAIL: BUILDING FOR GROWTH
To increase capacity of its line across western mountains, Canadian Pacific has undertaken three projects and is anticipating a fourth which will provide 41.9 miles of new second track and include a projected 8.9-mile tunnel. Traffic on this route is over 50 million gross tons annually, up from 24 million in 1970. The changes will reduce all westbound grades to 1 per cent, allowing 13,750-ton trains to operate with five units from Calgary to Vancouver. Soil stabilization, environmental effects and mountain construction all confronted the new lines' builders.

Malone, F *Railway Age* Vol. 180 No. 23, Dec. 1979, p 16, 5 Phot.

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00 304199
RESPONSE OF MODEL REINFORCED EARTH WALLS TO SEISMIC LOADING CONDITIONS
This report presents the results of ongoing studies aimed at developing a rational design method for reinforced earth retaining walls. The described method is based on results obtained from small laboratory scale walls subjected to horizontal sinusoidal loading with a shaking table. Tests show that the walls respond like a non-linear damped elastic system to the input vibrations. From measurements of the peak tie forces, an empirical design force envelope was developed which is a function only on input acceleration. It is suggested that the design earth pressures for an actual wall subjected to earthquake loading be based on this design force envelope using a base acceleration determined by response spectra modal participation factor techniques. Data are also presented of soil-tie friction under static and vibratory loading. Recommendations are given for calculating the size and spacing of ties including appropriate safety factors. The report is divided into pseudo static studies, vibration studies, and a summary paper.

Richardson, GN Lee, KL
California University, Los Angeles, National Science Foundation UCLA-ENG-7412, NSF/RA/E-74/520, Feb. 1974, 287 p.

Grant NSF-GI-38983

ACKNOWLEDGMENT: NTIS
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PB-297749/4ST

00 304311
TOTAL STRESS VERSUS EFFECTIVE STRESS STABILITY ANALYSIS OF EMBANKMENTS ON SOFT CLAY
This thesis investigates the use of two types of stability analysis, i.e. total stress and effective stress, for evaluating the factor of safety of embankments

constructed on soft clay. Three classes of stability problems are defined based upon the drainage conditions during construction and shear. The use of both types of analyses for each class of stability is discussed. The factors of safety computed for both types of analyses are compared for three situations: eight case studies of actual embankment failures; variation with embankment height for seven embankments; and the long term stability for two hypothetical embankments.

Boyce, SC
Air Force Institute of Technology MS Thesis AFIT-CI-79-99T, Dec. 1978, 109 p.

ACKNOWLEDGMENT: NTIS
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AD-A070839/6ST

00 304389
GROUTING OF SCOURED FOUNDATION, OLD RIVER LOW SILL STRUCTURE, LOUISIANA
In the emergency grouting operations at the Old River Low Sill Structure, Louisiana, in late 1973 and early 1974, the Concrete Laboratory of the U.S. Army Engineer Waterways Experiment Station was responsible for (a) development of a series of grout mixtures for placement in scoured areas, (b) supervision of mixing and placement of the grout mixtures, (c) development of instrumentation for monitoring uplift pressure and grout levels and locations beneath the structure, (d) the actual monitoring of uplift pressure and grout levels during grouting operations, and (e) determining the physical properties of field-placed grout. It is believed, after many check borings, that the physical properties of the field-placed grout closely match the design criteria, and the scoured areas have been successfully replaced. (Author)

Wilson, HK
Waterways Experiment Station Final Rpt. WES-MP-C-78-19, Dec. 1978, 28 p.

ACKNOWLEDGMENT: NTIS
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AD-A072466/6ST

00 304454
TUNNEL CONSTRUCTION. VOLUME 2. 1977-JULY, 1979 (CITATIONS FROM THE NTIS DATA BASE)
Unique tunneling methods, cost studies, tunnel support innovations, tunneling machines, and soil and rock properties encountered are investigated in these Government-sponsored research reports. Vehicular, water, sewage, and mine tunnels are reviewed. Finite element analysis is used extensively for investigation of soil and rock mechanics.

Habercom, GE, Jr
National Technical Information Service Sept. 1979, 142 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0900/5ST

00 304456
TUNNEL CONSTRUCTION. VOLUME 6. AUGUST, 1978-JULY, 1979 (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)
Unique tunneling methods, cost studies, tunnel support innovations, tunneling machines, and soil and rock properties encountered are investigated in these reports gathered in a worldwide literature survey. Vehicular, water, sewage, and mine tunnels are reviewed. Finite element analysis is used extensively for investigation of soil and rock mechanics.

Habercom, GE, Jr
National Technical Information Service Sept. 1979, 143 p.

ACKNOWLEDGMENT: NTIS
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00 307650
FROST PROTECTION OF RAILWAY LINES
The modern operation of railways with speeds of more than 100 km/h with all-welded rails and concrete sleepers demands a railway line completely free of frost heave. On railway lines in service, protection against frost is achieved by materials demanding only a minimum insulation depth, i.e., peat, bark, discarded sleepers or foam plastic. The combination of foam plastic with a gravel layer beneath is the most widely used method today. This paper describes the methods being used in railway construction with dimensional diagrams for frost insulation.

International Symposium on Ground Freezing, 1st, Bochum, West Germany, March 8-10, 1978.

Hartmark, H (Norwegian State Railways) *Engineering Geology* Vol. 13 No. 1-4, Apr. 1979, pp 505-517, 26 Ref.

ACKNOWLEDGMENT: EI
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00 307653
LARGE-SCALE FREEZING WORK FOR SUBWAY CONSTRUCTION IN JAPAN
Four parallel tunnels and two utility tunnels are being constructed simultaneously by the freezing method under a river in the central part of Tokyo. Over the proposed tunnels there exists an old concrete arch bridge across the river. In addition, in the river there are piers of an expressway viaduct close to the tunnels to be constructed. Under such conditions, this freezing work is being carried on with care, taking safety measures. The freezing work is described in detail, as are the safety measures.

International Symposium on Ground Freezing, 1st, Bochum, West Germany, March 8-10, 1978.

Miyoshi, M Tsukamoto, T Kiriyama, S *Engineering Geology* Vol. 13 No. 1-4, 1979, pp 397-415

ACKNOWLEDGMENT: EI
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DOTL JC

00 307654
SOIL-FREEZING METHOD FOR LARGE TUNNEL CONSTRUCTIONS
Examples of the use of the soil-freezing method applied in large tunneling projects show that this construction method can compete with traditional methods in both technical and economic aspects. Tunneling works executed in Stuttgart, Aarburg, Helsinki, Frankfurt, Duesseldorf and Zurich are described.

International Symposium on Ground Freezing, 1st, Bochum, West Germany, March 8-10, 1978.

Wind, H *Engineering Geology* Vol. 13 No. 1-4, Apr. 1979, pp 417-423

ACKNOWLEDGMENT: EI
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00 307655
SUBWAY CONSTRUCTION IN STUTTGART UNDER PROTECTION OF A FROZEN SOIL ROOF
Experiences gained on the building of the City Railway turning loop are described, the new Austrian tunneling method is used in connection with the freezing technique. The Metro-tunnel lies in leached-out gypsum marl and unleached zones, respectively. In a section of this tunnel within the leached-out gypsum marl, the excavation was protected by a frozen soil roof in order to keep away any water seepage which could be dangerous for the excavation itself, and for the buildings superimposed as well. The drilling for the freeze pipes, the installation and operation of the freezing system and the tunnel driving, including the erection of the final support, are described.

International Symposium on Ground Freezing, 1st, Bochum, West Germany, March 8-10, 1978.

Jonuscheit, G-P *Engineering Geology* Vol. 13 No. 1-4, Apr. 1979, pp 425-428

ACKNOWLEDGMENT: EI
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00 307665
REDECKING CHARING CROSS BRIDGE
During the summer part of the Charing Cross railway bridge across the Thames has been redecked, a process involving the complete renewal of the structure between the side trusses.

Joselin, C *Engineering* Vol. 219 No. 11, Nov. 1979, p 1445, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

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00 307675
SURVEYING: AN IMPORTANT ASPECT OF LINE CONSTRUCTION ON DB [Ingenieurvermessung: ein Arbeitsbereich bei grossen Bauvorhaben der Deutschen Bundesbahn]
The surveying department is involved at every level of planning and implementation of major line building projects. It also plays a key role in the case of lines being modernized, extension of S-Bahn lines to outer suburban areas and the construction or modernization of marshalling yards. [German]

Siems, E *Die Bundesbahn* Vol. 55 No. 8, Aug. 1979, pp 593-597, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

00 308274
POSTMORTEM INVESTIGATION OF THE KANSAS TEST TRACK, VOLUME II
The Kansas Test Track (KTT) was comprised of nine different track systems, which were founded on a designed embankment. The KTT subgrade experienced premature failure in service, and KTT operations were terminated in June 1975 after approximately six months of traffic. A postmortem investigation of the KTT was carried out in 1975 and 1976. Results of this investigation are presented in two volumes. Summary data, analyses, conclusions, and recommendations are presented in Volume I. Volume II is comprised of five appendixes which document the equipment and procedure used, and data obtained in KTT structures, vibroseismic, penetrometer, trenching, and instrumentation testing.

Cooper, SS Greer, HC, III Carlson, MM Bush, AJ, III Vispi, MA
Waterways Experiment Station, Federal Railroad Administration Final Rpt. FRA/ORD-79/09.II, Feb. 1979, 238 p., Figs., Tabs., 5 App.

Contract DOT-AR-30025

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PB80-138324, DOTL NTIS, DOTL RP

00 308282
THE STEEL RAIL BRIDGE OVER THE MAIN AT FRANKFURT-NIEDERRAD [Staelerne Eisenbahn-Stabbogenbruecke ueber den Main in Frankfurt-Niederrad]
A description of the 545-m double-track rail bridge built for the town-airport rail link. [German]

Konrath, H Jancke, K *Bauingenieur* Vol. 54 No. 9, 1979, pp 327-334, 9 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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00 308300
COMPUTERISED CALCULATION AND DRAWING OF LONGITUDINAL AND TRANSVERSE PROFILES OF THE ACTUAL AND IDEAL SITUATION [Computerunterstutztes Berechnen und Zeichnen von Laengs-und Querprofilen der Ist-und Soll-Situation]
Description of the new computer process devised by the DB to calculate and draw longitudinal and transverse line profiles. The programme calculates the figures for each point of the profile, together with intersecting points between the actual and ideal situations; it also identifies areas requiring embanking and clearing, and automatically makes a full drawing of the profile. [German]

Braesecke, J Stolz, H *Eisenbahningenieur* Vol. 30 No. 10, Oct. 1979, pp 425-434, 11 Phot., 3 Ref.

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

00 308434
PRESENT STATE OF TESTING OF FLEXIBLE UNDERLAYS FOR BALLAST BEDS
The DB is at present testing flexible ballast-bed underlays of varying degrees of rigidity with and without protective layer on railway structures with respect to their behaviour and their effect on the elasticity of the whole permanent way and with respect to their sound-deadening effect. Theoretical studies and actual practice have shown that as far as the permanent way is concerned the use of mats on structures is not necessary under present conditions of operation. In special cases, however, the lifting of mats to deaden noise on steel bridges can be necessary. No decision has yet been made on the use of mats for bridges and tunnels on new railway lines because the relevant studies have not yet been concluded, but provision has been made for them if neccessary. If mats are to be used, they will probably be laid loose on the surface without protective layer. The mats must meet the requirements of the technical conditions of supply and have an elasticity corresponding to a ballast number of C approximately 0.15N/cu mm. It is possible that, as a result of noise measurements, the required mat elasticity will have to be altered slightly. [German]

Kaess, G Stretz, R *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, p 671

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

DOTL JC

01 053335
OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC. STABILISATION OF BALLAST BY CHEMICAL METHODS
This report presents results of tests carried out to determine the effectiveness of ballast stabilisation by chemical gluing methods. These tests were carried out by BR, DB, SJ and SBB. Results of earlier tests by other Administrations are also given. (Japan, USA, etc.)

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

International Union of Railways D 117/RP 11, Oct. 1978, 52 p., 46 Fig.

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01 198280
LABORATORY EVALUATION OF CONCRETE TIES AND FASTENINGS FOR TRANSIT USE
This report was prepared as part of an ongoing research effort by the Urban Mass Transportation Administration (UMTA) to develop standard concrete ties for rapid transit use. The overall objective of this contract was to fabricate and evaluate, by laboratory tests, standard ties of different designs intended for transit use. Two tie designs, a pretensioned monoblock and a post-tensioned two-block, together with preliminary specifications for tie manufacture were developed in an earlier study by the Transit Development Corporation. Objectives of the investigation were to evaluate, by laboratory tests, the adequacy of: each of three fastening systems; each of the tie designs; and the assembled track components with ties supported on ballast and subjected to simulated rapid transit loading. Work performed to accomplish these objectives included fabrication of prestressed concrete ties and testing of ties, fastenings, and assembled track components.

See also report PB-297570.

Hanna, AN
Portland Cement Association, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0100) Final Rpt. DOT-TSC-UMTA-79-24, Mar. 1979, 79 p.

Contract DOT-TSC-1442

ACKNOWLEDGMENT: NTIS
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PB-297533/2ST, DOTL NTIS

01 198283
MEASUREMENT PROGRAM FOR EVALUATION OF CONCRETE TIES AND FASTENINGS IN TRANSIT TRACK
This report outlines a measurement program to obtain data on the performance of standard tie designs and associated fastening systems under field service conditions. In addition, the program identifies limited data to be obtained from a wood tie track for comparison. Recommendations are presented for a measurement program for monitoring, over an extended duration, the performance of different cross tie track systems under typical transit conditions. The following topics are discussed herein: type of data to be collected; type of instrumentation to be installed; type of equipment required for data acquisition; test schedule; and criteria for evaluating test data. The recommendations presented in this report are applicable to wood and concrete cross-tie track systems.

See also PB-297533.

Hanna, AN
Portland Cement Association, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0100) Final Rpt. DOT-TSC-UMTA-79-18, Mar. 1979, 42 p.

Contract DOT-TSC-1442

ACKNOWLEDGMENT: NTIS
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PB-297570/4ST, DOTL NTIS

01 198580
PROBLEMS AND NEEDS IN TRACK STRUCTURE DESIGN AND ANALYSIS
The report discusses the design aspects of old and new track systems, the research needs in track structure design, and methods of track analysis.

Sponsored in part by Association of American Railroads, Chicago, Illinois. This is an expanded version of RRIS 01 183892 which appeared in Transportation Research Record No. 653.

Kerr, AD
Princeton University, Association of American Railroads Technical Center, National Science Foundation 77-TR-7, Sept. 1977, 32 p.

Grant NSF-ENG74-19030

ACKNOWLEDGMENT: NTIS
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PB-294727/3ST

01 198588
ON THERMAL BUCKLING OF STRAIGHT RAILROAD TRACKS AND THE EFFECT OF TRACK LENGTH ON THE TRACK RESPONSE
A comparison of track buckling tests conducted by various railroads, with some recent analyses suggests that a number of the used buckling test facilities may have been too short, and hence the test results obtained may not represent the actual conditions in the field. Using the analysis for thermal track buckling recently derived by the author, the response of a long track is discussed first. It is shown that the drop of the axial force due to buckling is substantial. It is also shown that, contrary to a claim made by many authors, even a perfectly straight track may buckle beyond a certain temperature increase. The effect of lateral geometrical imperfection is pointed out. The short heated track is then analyzed, in order to determine the effect of test track length on the safe temperature increase and on the track displacements. It was found that track length does affect these quantities-namely, the shorter the test track the larger the effect-and thus that track length below a specific value will noticeably affect the test results. Paper concludes with a discussion of the consequences of these findings.

Kerr, AD
Princeton University, National Science Foundation Res Rpt. 76-TR-19, Nov. 1976, 34 p.

Grant NSF-ENG74-19030

ACKNOWLEDGMENT: NTIS
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PB-295019/4ST

01 198594
AN IMPROVED ANALYSIS OF RAIL STRESSES AND RAIL-TIE CONTACT FORCES, FOR A CROSS-TIE TRACK
Presently, the dominant method for calculating rail stresses and rail-tie contact forces is based on the model of a beam on a Winkler base. One shortcoming of this analysis is that it neglects the effect of the moments which the ties exert on the rails, since when the rails deflect in the vertical plane the cross-ties in addition to displacing vertically also rotate about their axes and the ballast resists these rotations. The paper presents an improved analysis of this problem. It also suggests a simple method for the determination of the track parameters which enter the analysis and demonstrates its use on actual track test data. Paper concludes with a comparison of analytical and track test data, in order to establish the accuracy of the proposed analysis.

Sponsored in part by Association of American Railroads, Chicago, IL. Technical Center.

Kerr, AD
Princeton University, Association of American Railroads Technical Center, National Science Foundation 78-TR-1, Jan. 1978, 19 p.

Grant NSF-ENG77-09156

ACKNOWLEDGMENT: NTIS
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PB-295081/4ST

01 198616
CONSTRUCTION, INSPECTION AND MAINTENANCE OF MINE HAULAGE TRACK, VOLUME 1
Track in underground bituminous coal mines was investigated and technology was taken from other industries to obtain information on conditions that impair the safety and efficiency of the track and to develop guidelines and useful information on the construction, inspection, and maintenance of mine track. Volume I contains information on the investigations; observed track conditions; useful technology from railroads and other industries; derivations of track condition descriptors; and limits, conclusions, and recommendations.

See also Volume 2, RRIS 01 198618 and Volume 3, RRIS 04 198617, Bulletin 8001. Also available in set of 3 reports PC E09, PB-295 552-SET.

Cunney, EG Rudd, TJ Hawkins, S
ENSCO, Incorporated, Bureau of Mines Final Rpt. BUMINES-OFR-49(1)-79, Nov. 1977, 188 p.

Contract H0166048

ACKNOWLEDGMENT: NTIS
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PB-295553/2ST

01 198617
CONSTRUCTION, INSPECTION AND MAINTENANCE OF MINE HAULAGE TRACK, VOLUME 3. INSPECTION HANDBOOK
Track in underground bituminous coal mines was investigated and technology was taken from other industries to obtain information on conditions that impair the safety and efficiency of the track and to develop guidelines and useful information on the construction, inspection and maintenance of mine track. Volume 3 summarizes recommended standards and procedures from volume 2 and provides related information for ready reference by inspectors in the mines.

See also RRIS 01 198616; Bulletin 8001. Also available in set of 3 reports PC E09, PB-295 552-SET.

Cunney, EG
ENSCO, Incorporated, Bureau of Mines Final Rpt. BUMINES-OFR-49(3)-79, Nov. 1977, 61 p.

Contract H0166048

ACKNOWLEDGMENT: NTIS
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PB-295554/0ST

01 198618
CONSTRUCTION, INSPECTION AND MAINTENANCE OF MINE HAULAGE TRACK, VOLUME 2. GUIDELINES
Track in underground bituminous coal mines was investigated, and technology was taken from other industries to obtain information on conditions that impair the safety and efficiency of the track and to develop guidelines and useful information on the construction, inspection and maintenance of mine track. Volume 2 contains recommended standards and practices for mine track. It includes the relation of track conditions to safe speeds; descriptions and limits for measurable track features such as gage; descriptions of conditions for track components that are normally not measurable, such as subbase soils; construction requirements and techniques, inspection requirements, and methods; and methods for managing and performing track maintenance work.

See also RRIS 01 198616; Bulletin 8001. Also available in set of 3 reports PC E09, PB-295 552-SET.

Cunney, EG Rudd, TJ Kauffman, PW
ENSCO, Incorporated, Bureau of Mines Final Rpt. BUMINES-OFR-49(2)-79, Nov. 1977, 148 p.

Contract H0166048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-295555/7ST

01 198744
PRELIMINARY SPECIFICATIONS FOR STANDARD CONCRETE TIES AND FASTENINGS FOR TRANSIT TRACK
These revised specifications cover requirements for component materials, manufacturing procedures, and handling of mono-block and two-block concrete (prestressed) cross ties, pads, and insulators for rapid transit use. It also includes requirements for rail fastenings for securing running rails, and the inserts for anchoring both the rail fastenings and the traction power contact rail support bracket. These specifications are preliminary and will be modified, as necessary, on the basis of in-track tests. This report includes Appendix A: "Details of Concrete Ties", Appendix B: "Report of New Technology", and a Listing of References.

Hanna, AN
Portland Cement Association, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0100) Final Rpt. DOT-TSC-UMTA-79/17, Mar. 1979, 50 p.

Contract DOT-TSC-1442

ACKNOWLEDGMENT: NTIS
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PB-297850/0ST, DOTL NTIS

01 198939
DETERMINATION OF ADMISSIBLE TEMPERATURE INCREASES TO PREVENT VERTICAL TRACK BUCKLING
An analysis is presented for the determination of the range of "safe" temperature increases in a railroad track, in order to prevent vertical buckling. A general nonlinear formulation of the problem is derived by using the theory of elasticity, the principle of virtual displacements and the variational calculus for variable matching points. In order to simplify the solution it is shown, on a closely related problem, that a number of highly nonlinear terms may be neglected without affecting the final results. The obtained nonlinear formulation for the railroad track is simplified accordingly. The resulting nonlinear equations are then solved, in closed form, and the obtained results are presented graphically.

Kerr, AD El-Aini, YM
Princeton University, National Science Foundation, Federal Highway Administration Tech Rpt. 75-SM-3, Dec. 1975, 43 p.

Contract DOT-FR-40017

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-297208/1ST

01 300552
TRACK GEOMETRY CARS FOR MAINTENANCE PLANNING AND QUALITY CONTROL
Results of a survey indicate the usage made by American railroads of track inspection cars. Types of cars, parameters measured and the instrumentation, operation, accuracy and defect detection, use for maintenance planning, and forecasts about future use are summarized. It is concluded that the state of the art in track geometry cars is not currently at an acceptable level.

Proceedings of the Ninetieth Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 18-20, 1978, Chicago, Illinois.

Webb, HG (Atchison, Topeka and Santa Fe Railway)
Roadmasters' & Maintenance of Way Assn of America 1978, pp 36-41

ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 300553
UNDERCUTTING OF TRACK
Undercutting, the process by which ballast and subballast are removed from under ties for either cleaning or wastage, is discussed. Four processes are described.

Proceedings of the Ninetieth Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 18-20, 1978, Chicago, Illinois.

Roadmasters' & Maintenance of Way Assn of America 1978, pp 48-53, 7 Fig.

ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 300554
CONTROL OF EXPANSION IN CWR
This report on control of expansion in Continuous Welded Rail indicates that ballast section, cross ties, rail anchors and spiking patterns all have important roles. The temperature at which rail is laid and at which it is subsequently worked are of importance.

Proceedings of the Ninetieth Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 18-20, 1978, Chicago, Illinois.

Roadmasters' & Maintenance of Way Assn of America 1978, pp 54-58

ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 300555
COMPLETE TRACK RENEWAL SYSTEMS
Details of the two concepts of high-production track renewal are given--the Gantry System and Track Panel System. Both have similarities. The Gantry System removes old track in panel form and new track is laid with individual

components. The Track Panel System removes the old track in panel form and lays new track in panels with jointed rail that is subsequently replaced by Continuous Welded Rail. Both incorporate a series of machines working in unison.

Proceedings of the Ninetieth Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 18-20, 1978, Chicago, Illinois.

Roadmasters' & Maintenance of Way Assn of America 1978, pp 111-124

ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 300557
MATCHING TIE LIFE TO REPLACEMENT CYCLE

With an understanding of "average tie life" it is possible to establish a railroad's tie installation program. Two charts from Forest Products Laboratory make it possible to understand the difference between average and ultimate life with implications on the quantities and frequencies for tie replacement.

See also RRIS 01 195549; Bulletin 7902.

Abbott, RA *Railway Track and Structures* Vol. 75 No. 7, July 1979, p 66, 2 Fig., 1 Tab.

ORDER FROM: ESL

DOTL JC

01 300624
GAMMA-RAY BACKSCATTER APPLIED TO THE ON-LINE LOCATION OF TERMITE-DAMAGED RAILWAY SLEEPERS

A radioisotope system has been developed to locate groups of termite-damaged sleepers during continuous scans of a railway track. It depends on measuring the intensities of collimated beams of caesium-137 gamma-rays backscattered from within the sleeper. The detected intensity varies with the amount of termite damage (i.e. voidage). Variations in intensity caused by changes in the density of sound sleepers are minimized by the geometrical arrangement of source, shields and detector. The Atomic Voidage Detector (AVD) has been tested in field trials on the Newman to Port Hedland railway, Western Australia. Four separate groups of termite-damaged sleepers were located and examined.

Fookes, RA Watts, JS Seatonberry, BW Davison, A Greig, RA Lowe, HWG Abbott, AC *International J of Applied Radiation and Isotopes* Vol. 29 No. 12, Dec. 1978, pp 721-728, 1 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 300631
PHYSICAL FUNDAMENTALS OF AN OBJECTIVE RATING OF THE SIGNALS IN HIGH-SPEED ELECTROMAGNETIC INSPECTION OF RAILROAD RAILS

A study was made of the magnetization conditions of rails by a moving electromagnetic inspection car, the dynamic fields of the rail defects, and their revealability in different zones between the poles of an electromagnet. A method of separating signals from defects of different degrees of danger is described and the results of its service verification are checked.

Dovnar, BP (All-Union Scientific Res Inst of Railroad Transp); Scscherbinina, VA *Soviet Journal of Nondestructive Testing* Vol. 14 No. 5, May 1978, pp 429-435, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 300668
PREDICTION OF FATIGUE CRACK GROWTH IN RAILROAD RAILS

The objective of this study was the development of a computational model for the prediction of fatigue-crack propagation in rails under train-service loading. Constant-amplitude fatigue-crack-growth properties were determined for 66 rail steels. The effects of mean stress, temperature, and crack orientation were investigated. Variable-amplitude tests showed almost no load-interaction effects in fatigue crack growth in rail steels. Thus a linear integration scheme could be used for crack-growth prediction. Service-simulation tests were performed on the basis of four measured load spectra. The specimens were subjected to random loading, train-by-train loading, loading that used a sequence associated with 170 trains of six different types, and unit-train loading. The load sequence represented 0.9 million gross metric tons (1 million gross tons) of traffic and was repeated until failure of the specimens. Crack growth in the service-simulation tests could be reproduced by using the computational prediction model within a factor of 2 and within a factor of 1.5 in most cases. Discrepancies between predictions and tests results are partially due to the variability of crack-growth properties of rail steels. The way in which the prediction model can be used in a reliability analysis for failure-rate prediction is discussed. Such an analysis would allow management decisions with regard to the most cost-effective means to reduce failure rates of a given track. This is possible because the relative accuracy of the crack-growth prediction is expected to be better than its absolute accuracy.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Broek, D Rice, RC (Battelle Columbus Laboratories); Steele, RK (Transportation Systems Center) *Transportation Research Record* No. 694, 1978, pp 2-10, 17 Fig., 2 Tab., 4 Ref.

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DOTL JC

01 300669
INTRODUCTION TO STRESSES IN RAILS: STRESSES IN MIDRAIL REGIONS

The results of an extended analysis of the stresses in rails are summarized as an introduction to the mechanisms that drive rail flaws to failure. The mechanics of rail flexural, thermal, contact, and residual stress development are discussed in terms of the distribution of stresses in the rail, the stress cycles that occur with wheel passage, and their relationship to the propagation of typical midrail flaws. These analyses are limited to continuously welded rails and the regions of bolted-joint rails that are outside of the influence of the rail joints.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Johns, TG Davies, KB (Battelle Columbus Laboratories); McConnell, DP (Transportation Systems Center) *Transportation Research Record* No. 694, 1978, pp 10-19, 14 Fig., 10 Ref.

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DOTL JC

01 300670
ANALYTICAL AND EXPERIMENTAL STUDY OF RESIDUAL STRESS IN RAILS

A mathematical model for the calculation of railhead residual stresses is presented together with the results for a specific case of wheel loading. These data are then compared with the results obtained by destructive evaluation of residual stresses in simulated railhead specimens. Finally, the results obtained are compared with published values for residual stress.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Davies, KB Johns, TG (Battelle Columbus Laboratories) *Transportation Research Record* No. 694, 1978, pp 19-24, 5 Fig., 6 Ref.

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DOTL JC

01 300671
MATHEMATICAL MODEL FOR LATERAL THERMAL BUCKLING AND DISPLACEMENT OF CURVED TRACK

One disadvantage of continuously welded rails is that the possibility of track buckling because of temperature increases is increased significantly by the elimination of rail joints. Many mathematical models have been developed for the buckling of tangent tracks, but there are very few that deal with curved tracks. The objective of this paper is the development of methods for the prediction of both the lateral thermal-buckling load and the corresponding displacement of curved tracks so that criteria for track design, maintenance, and evaluation can be formulated. This objective has been achieved by using a two-dimensional finite-element model that simulates the lateral stability of a track subjected to temperature increases and train wheel loads. This paper illustrates only the basic applications and the potential of the model. A parameter investigation was made that included tracks that had curvatures varying from 0 to 10 deg and studied the effects of various track parameters on the buckling temperature and the lateral track displacement. The results indicate that the buckling temperature and lateral

displacement of a curved track are significantly affected by changes in lateral ballast resistance, misalignment and curvature, and by the presence of ineffective ties. The model provides a promising new approach to the track-buckling problem; however, test data are needed to validate it.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

So, W (Association of American Railroads Technical Center); Yang, WW (Consolidated Rail Corporation) *Transportation Research Record* No. 694, 1978, pp 24-29, 15 Fig., 1 Tab., 23 Ref.

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01 300672
STATISTICAL DESCRIPTION OF SERVICE LOADS FOR CONCRETE CROSSTIE TRACK

Measurements of loads and bending moments on concrete crossties for several days of revenue traffic were used to develop a statistical description of track loads for tangent and curved tracks that have variable tie spacing. The measured data show large tie-to-tie variations in loads and a load-dependent tie support condition. Many ties were center-bound for loads from light or empty cars, but the tie support became more uniform for heavy wheel loads. Maximum tie bending moments measured on curved track were considerably higher than those on tangent track because of the increase in vertical and lateral loads on the high rail when trains exceed the balance speed of the curve. Tie bending moments measured in this program were considerably lower than the current static flexural strength requirements for a probabilistic prediction of maximum load for a 50-year life. These and data from other concrete-tie test installations indicate a need to identify the failure mechanism for concrete ties so that statistical load descriptions can be used for future design and testing. Low-probability maximum loads will be very important if failures result from infrequent loads that exceed the static strength. However, the higher probability means cyclic loads will be the more important factor if fatigue is identified as the governing failure mechanism.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Prause, RH (Battelle Columbus Laboratories); Kish, A (Transportation Systems Center) *Transportation Research Record* Vol. N No. 94, 1978, pp 30-39, 11 Fig., 2 Tab., 5 Ref.

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01 300673
DEVELOPMENT OF MULTILAYER ANALYSIS MODEL FOR TIE-BALLAST TRACK STRUCTURES

A multilayer analysis model for tie-ballast track structures has been developed. The model includes the effects of rail bending, rail-fastener stiffness, tie bending, variable ballast and subgrade material types, and variable tie spacing and ballast depth. The results predicted by using the model are compared with experimental results and excellent agreement is shown. The model offers the advantages of simplicity of use and reduced computer run time when compared with the finite-element codes currently used.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Kennedy, JC, Jr Prause, RH (Battelle Columbus Laboratories) *Transportation Research Record* No. 694, 1978, pp 39-47, 9 Fig., 1 Tab., 6 Ref.

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01 300674
PERMANENT-DEFORMATION BEHAVIOR OF RAILWAY BALLAST

Ballast materials were tested in the triaxial apparatus by using a repeated deviator stress and a constant confining pressure. Permanent deformation (plastic) characteristics at several stress levels were determined for a variety of types and gradations of material. Correlation analyses were made between the plastic response and the results of standard material-characterization tests. The results indicate that the most important factor influencing the repeated-load plastic-strain behavior of ballast is the degree of compaction. The stress level was also found to be an important factor; there was some indication that permanent deformation was less for the more nearly well graded specimens. Finally, unlike the resilient response, the permanent-deformation behavior of ballast is dependent on loading history.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Knutson, RM (Kansas University); Thompson, MR (Illinois University, Urbana) *Transportation Research Record* No. 694, 1978, pp 47-53, 4 Tab., 13 Ref.

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DOTL JC

01 300675
BALLAST AND SUBGRADE RESPONSE TO TRAIN LOADS

Ballast and subgrade play major roles in the maintenance life of track structures because they are the source of the cumulative permanent deformation associated with the deterioration of surface and line. Ballast is also the principal means of correcting for this deterioration, which is caused by traffic and environmental factors. Better methods are still needed for the prediction of the effects of the controlling parameters on track performance for more rational track design and maintenance planning. The purpose of this paper is to provide a better understanding of these problems and describe progress being made toward their solution. The functions of ballast and subgrade are briefly discussed, and the mechanisms of permanent deformation are described. Newly developed or improved methods to measure the in situ physical state of ballast are presented, and examples of results from field tests are given. The capabilities of existing analytical track structure models for the prediction of track deterioration are assessed. New instrumentation techniques used for measuring the dynamic and permanent strains and deformations in ballast and subgrade are described. Finally, the characteristics of the stress, strain, and deformation in ballast and subgrade are illustrated with results of both analytical and experimental studies.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Selig, ET (State University of New York, Buffalo); Sluz, A (Transportation Systems Center) *Transportation Research Record* No. 694, 1978, pp 53-60, 12 Fig., 20 Ref.

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01 300726
EFFECT OF RAIL SECTION AND TRAFFIC ON RAIL FATIGUE LIFE

This paper extends a methodology of fatigue analysis for prediction of rail service life to studying the effect of changing rail section size. The effect of different traffic loadings, specifically mixed freight versus unit train traffic, and effect of varying track support conditions are also reported.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Zarembski, AM (Association of American Railroads) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 514-527, 9 Fig., 11 Ref.

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01 300727
TRACK TRAIN DYNAMICS CONTRIBUTIONS TO RAIL METALLURGY

As a phase of the Track Train Dynamics Program, rail metallurgy has been studied extensively. One phase involved statistical analysis of rail defects from six test segments carrying 23 to 40 million gross tons annually at speeds to 79 mph. Statistical analysis of 1160 defects on 276 miles of track with rail ranging from 8 to 20 years of age determined the time-to-occurence probability distributions governing defect occurence and compared these probabilities for various locations, defect types and rail sections.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Stone, DH (Association of American Railroads Technical Center) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 528-543, 7 Fig., 3 Tab., 12 Ref.

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01 300729
TEST ON CHARACTERISTICS OF BALLASTED TRACK LAID ON SOIL ROADBED
Relating to the new theory on deterioration of track including the soil subgrade, various loading tests were carried out to explain the characteristics of ballasted track laid on soil subgrade. Static and dynamic properties were classified and the effects of load magnitude, watering and tamping on the subsidence of track were made clear. These test results will yield data for investigation on the characteristics of ballasted track.

Nagafuji, T Noguchi, T *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 4, Dec. 1978, pp 174-175

ACKNOWLEDGMENT: British Railways
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

01 300732
SPECIAL RECORD: THE TRACK
A series of short articles on the treatment of surface defects in rails; a track reconditioning machine; and permanent way maintenance.

French Railway Techniques Vol. 22 No. 1, 1979, pp 11-39

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

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01 300733
IN-TRACK RAIL RECTIFICATION SAVES MONEY
Rectification of rail in track is now widely accepted as an important factor in maintaining a technically superior track. But experience on several of the world's larger railway systems has shown that this method also produces substantial economies, safeguards the environment and improves track safety. Savings are made as a result of the reduction in overall track maintenance costs made possible by in-track rail rectification. And because this method leads to a substantial reduction in track vibration. Savings are made in motive power output and in the maintenance of rolling stock.

International Railway Journal Mar. 1979, pp 36-38

ACKNOWLEDGMENT: British Railways
ORDER FROM: Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013

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01 301163
PRESENT STAGE IN THE DEVELOPMENT OF SLAB TRACK [Derzeiter Stand bei der Entwicklung des Oberbaues auf fester Fahrbahn]
First results of tests on slab track laid last year on the Dachau-Karlsfeld test section. [German]

Oberweiler, G *Internationales Verkehrswesen* Vol. 31 No. 1, Jan. 1979, pp 51-52, 7 Phot.

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

01 301176
IS A NEW RAIL PROFILE ADVISABLE? [Ist eine neue Schienenprofilform wuenschenswert?]
The increase in both axle load and speed means increasingly large rail sections are needed. On the other hand, disadvantages stem from the fact that ever greater factory tolerances have to be allowed for economic reasons, although, because of increases in speed, it would be advisable, or even necessary, to reduce these tolerances. Moreover, larger rail sections produce an increase in vertical dynamics. The article discusses the advantages and disadvantages of present rails. The author then explains what he thinks appropriate for the design of a more appropriate rail section. [German]

Herbst, W
Technical University of Berlin, West Germany DB: Dok 4956, 1978, pp 80-145, 84 Phot., 2 Ref., 1 App.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Technical University of Berlin, West Germany, Schriftenreihe des Inst f Verkehrsplanung u Verkehrswegebau, 1000 Berlin 12, West Germany

01 301183
PROPAGATION OF FATIGUE CRACKS IN RAIL ACCORDING TO THE LAW OF PARIS [Propagacja peknieo zmeczeniowych szyn w swietle prawa Paris'a]
No Abstract. [Polish]

Chmiel, E *Drogi Kolejowe* Vol. 2-26 No. 2, Feb. 1979, pp 33-34, 10 Fig., 2 Tab., 9 Ref.

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

01 301418
TRACK ON FIXED BED. DEVELOPMENTS AND TESTS ON THE DB [Der Oberbau auf fester Fahrbahn. Entwicklungen und Versuche bei der Deutschen Bundesbahn]
Information from lengthy tests in Hirschaid, Rheda/Oelde and Dachau/-Karlsfeld shows how track laid on a fixed bed, as recommended when the ground is of a very specific type, can also be a valid solution when track is laid on a deck. The only way in general to avoid subsidence is by relevelling and putting new pressure on the support plate. Moreover, a minimum of maintenance is needed to obtain economic results that compare well with track with ballast. [German]

Oberweiles, G *Bettungsloser Oberbau bei Schienenbahnen* Vol. 69 DB:Dok 4980, 1979, pp 77-81, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Erich Schmidt Verlag, Herforder Strasse 10, Postfach 7330, 4800 Bielefeld 1, West Germany

01 301421
THE NEW INTERCITY-SYSTEM FROM THE STANDPOINT OF THE CIVIL ENGINEER'S DEPARTMENT [Das neue Intercity-System aus der Sicht des Baudienstes]
Since 27 May 1979, the Intercity trains operate hourly over a network of some 3,100 km of lines, with the slogan "Every hour, every class". The writer describes the activities of the Civil Engineer's Department to provide this service, and its repercussions on track and structure maintenance service. [German]

Mueller, H *Eisenbahningenieur* Vol. 30 No. 5, 1979, pp 184-188, 1 Tab.

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

01 301446
CALCULATIONS ON SUBSIDENCE OF TRACK BY "NEW THEORY ON TRACK DETERIORATION"
A theory of track deterioration based on subsidence of ballast and of subgrade has been investigated. An equation for deterioration of heavy traffic lines with continuous welded rail taking into consideration speed, traffic density, roadbed condition and other factors shows that subsidence of bad track is about four times that of good track.

Hirano, M *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, p 84, 1 Fig., 1 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

01 301814
THE CONCRETE TIE TODAY
This status report covers those railroads where concrete cross ties are an established policy or where they are on the verge of gaining acceptance, at least for limited use. Included are Canadian National, Amtrak, Florida East Coast, Apalachicola Northern, Chessie and Black Mesa and Lake Powell.

Railway Track and Structures Vol. 75 No. 8, Aug. 1979, pp 24-28, 6 Phot.

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01 301815
IN CONCRETE-TIE TRACK: GETTING DOWN TO THE DETAILS
Track structures which involve concrete cross ties and will function with a minimum of maintenance are described. Details include combinations of tie pads and fastenings, ballast requirements, transitions between concrete tie

track and wood tie track, transitions at bridges and grade crossings, and the problems of jointed rail are discussed. It is recommended that continuous welded rail be used on concrete ties.

Weber, JW *Railway Track and Structures* Vol. 75 No. 8, Aug. 1979, pp 30-32, 4 Fig., 1 Phot.

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01 301816
AUTOMATED RAIL CHANGE OUT FOR CONVENTIONAL TRACK
The Canron RCO (Rail Change Out) Machine, a refinement of the P-811 that is used for installing concrete ties and welded rail, is designed for changing out rail on existing timber ties while handling traditional fasteners and other material. The 221-ft self-powered unit picks up both jointed rails at one time and threads each to trackside. It also lifts out old tie plates, plugs old spike holes, creosotes ties, and threads in and fastens new welded rail in an automatic and continuous cycle. Canadian National operates two such units.

Railway Track and Structures Vol. 75 No. 8, Aug. 1979, pp 40-44, 5 Phot.

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01 301817
THE LONG ISLAND RAIL ROAD: SMALL IN SIZE, BIG IN M/W THINKING
This New York railroad with 95% of its 860 daily trains in commuter service presents track maintenance problems. The biggest is getting access to the track so it can be maintained properly; dense population makes night work generally unacceptable. The installation of continuous welded rail is a goal that will not be achieved on light-density lines for years but stone ballast is going under all track now. LI uses Pandrol fasteners on wood ties to produce a stiff track structure and avoid spike killing. Concrete ties would be used only for complete track rebuilding. A track geometry car is an integral of the track maintenance planning. On elevated structures and recently on a newly placed and compacted fill LI is using concrete slab track like that used on BART.

Railway Track and Structures Vol. 75 No. 9, Sept. 1979, p 20, 4 Phot.

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01 301818
MATCHING M/W PRACTICE TO REQUIRED USE OF TRACK--PART 1: CURING THE PROBLEMS, NOT THE SYMPTOMS
This first of four articles discusses misuse of FRA Track Safety Standards and problems involved with subgrade and drainage. FRA Standards are a useful indicator of minimum track conditions under which trains can be operated at certain speeds, but have little relationship to optimum or economical track conditions. Higher axle loads have upset subgrade equilibrium established before solid engineering and compacting equipment had evolved. Drainage and soil stabilization are essential in optimizing subgrade strength.

Ahlf, RE (Illinois Central Gulf Railroad) *Railway Track and Structures* Vol. 75 No. 9, Sept. 1979, p 34, 2 Fig., 4 Phot.

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DOTL JC

01 302148
IMPROVED STRESS ANALYSIS FOR CROSS-TIE TRACKS
Presently, the dominant method for calculating rail stresses and rail-tie contact forces is based on the model of a beam on a Winkler base. One shortcoming of this analysis is that it neglects the effect of the moments that the ties exert on the rails when the rails deflect in the vertical plane. The paper presents an improved analysis of this problem. It also suggests a simple method for the determination of the track parameters that enter the analysis and demonstrates its use on actual track test data. Paper concludes with a comparison of analytical and track test results.

Kerr, AD (Delaware University, Newark) *ASCE Journal of the Engineering Mechanics Division* Vol. 105 No. 4, Aug. 1979, pp 539-548, 12 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

01 302154
PLASTICS IN RAILWAY TRACK SUPERSTRUCTURES
Plastics have found some interesting uses in the construction and maintenance of railway and underground railway tracks, thanks to their technical and economic advantages. These applications include the protection of foundations against water and frost, impact-damping force transmission, electrical insulation, acoustic insulation. This article summarizes these applications. [German]

Keim, D *Kunststoffe-German Plastics* Vol. 69 No. 4, Apr. 1979, pp 17-18

ACKNOWLEDGMENT: EI
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01 302162
RAILROADS IN TRANSITION: BETTER BUT NOT DIFFERENT
In a survey of track engineers and researchers, it was concluded that demands of increased tonnages may require some changes in track components but that today's track structure of welded rail on treated wood ties on crushed rock ballast will not change drastically in the next decade. The challenges of 100-ton cars, concrete cross ties, rail fasteners, and maintenance equipment are all discussed.

Breen, T *Modern Railroads/Rail Transit* Vol. 34 No. 11, Oct. 1979, pp 51-55, 5 Phot.

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01 302170
SOUTHERN: A FIRM FOUNDATION FOR RELIABLE SERVICE
The philosophy and practices of Southern Railway for maintaining its track are described. For almost two decades Southern has strived to reduce the labor content of its track maintenance expenses and has a record better than other major railroads. The road also pioneered in the use of system gangs for rail renewal and for timbering and surfacing with maximum mechanization. For years Southern has consistently had the highest expenditure on maintenance of way of any major system. Its practices with respect to continuous welded rail, cross ties, hardened rail, granite ballast and drainage are discussed. The road's track geometry car is an integral tool in track maintenance planning.

Armstrong, JH *Railway Age* Vol. 180 No. 19, Oct. 1979, pp 24-33, 4 Phot.

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01 302323
EFFICIENT PROTECTION OF RAILWAY TERRITORY [Nadenaja zascita stal'noj kolei]
The SZD has 80,000 km of protective barriers. Compared with 1950, the protection of railways against snow and sand increased from 25% to 80%. The article explains the advantages of building these barriers and gives some examples of savings for the railways. Furthermore, it describes the different varieties of trees and shrubs planted along the track, as well as the maintenance of protective forests, taking into account the mechanization of maintenance work. [Russian]

Smatov, VI *Put'i Putevoye Khozyaistvo* No. 7, 1979, pp 1-3

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

01 302330
MEASURING WORK IN THE RENEWAL OF CROSS TIES ON STEEL BRIDGES [Vermessungstechnische Arbeiten bei Brueckenschwellenerneuerungen auf staehlernen]
When ties on bridges have to be replaced, they are prepared in advance in order to reduce traffic interruptions to the minimum. For this purpose the measuring department supplied details of the thickness measurements of ties, taking the theoretical track bed into account. Once the ties have been positioned and fastened, no further corrections can be made. Data supplied by the measuring department must therefore be reliable and completely accurate. The article describes the various operations and checking procedures involved. [German]

Krall, H *Eisenbahningenieur* Vol. 30 No. 7, July 1979, pp 311-314, 10 Phot., 3 Ref.

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

01 302366
BN TRACKS ARE READY AS COAL PRODUCTION TAKES OFF
Low-sulphur coal moving in unit trains out of Wyoming and southern Montana has imposed a heavy burden on the permanent way as volume soars. Several new lines have been opened, but the principal task is to strengthen the track on routes such as Gillette to Lincoln on which annual gross tonnage will exceed 100 million by 1983, more than a tenfold increase since 1970. Heavier rail and good quality ballast are essential, but more frequent inspection is needed to keep line and level within stringent limits. Bridges have been replaced and embankments stabilised to resist the impact of 30 ton axleloads.

Johnston, WS (Burlington Northern) *Railway Gazette International* Vol. 135 No. 10, Oct. 1979, pp 891-894, 5 Phot.

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01 302368
DESIGN REFINEMENTS MAKE THE STEEL SLEEPER VIABLE
Although steel is a relatively expensive material, careful investigation into the optimum rolled section for different loadings and duty cycles has produced a range of sleepers which are competitive with wood and concrete, bearing in mind the long life and high scrap value. Trials with 2500 heavy-duty steel sleepers on the Mount Newman iron ore line with 30-tonne axleloads have proved successful; two other types for main and secondary lines have been developed. One-piece polyethylene pads insulate the rail from sleeper and fastenings to permit the use of track circuits.

Brown, JH *Railway Gazette International* Vol. 135 No. 10, Oct. 1979, pp 902-906, 5 Fig., 2 Tab., 4 Phot., 14 Ref.

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01 302699
THE FUTURE OF M/W MACHINERY--A LOOK AT THE OPTIONS
The types and volumes of track maintenance machines to be acquired in coming years are forecast. With present methods of maintenance that require machines to stop at each tie nearing their limits, other means of reducing cost and track possession time are being sought. Ballast cleaning promises to become more important as does the European concept of track renewal. Outlook looks promising also for track geometry cars and for large multi-function machines such as the rail changeout machine. A requirement for future maintenance machines must be the ability to deadhead more rapidly over track to shorten time to reach work sites and to increase the productive time during track possessions.

Burns, DR *Railway Track and Structures* Vol. 75 No. 10, Oct. 1979, p 72, 2 Phot.

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01 302700
MATCHING M/W PRACTICE TO REQUIRED USE OF TRACK--PART II: TIES AND BALLAST
The track structure from subballast through ballast to the ties is discussed. Ballast materials, cleaning and detrimental effects of mud pumping are discussed. Track stiffness is affected by ballast depth and fouling, as well as by subgrade conditions. At the end is a handy table of recommendations for handling subgrade, ballast and ties.

Ahlf, RE (Illinois Central Gulf Railroad) *Railway Track and Structures* Vol. 75 No. 10, Oct. 1979, p 81, 3 Fig., 5 Phot.

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01 302701
ELECTRONIC DEVICE MEASURES, ANALYZES RAIL CORRUGATIONS
Development of a track inspection unit designed to operate at 4 mph permits collection and analysis of rail corrugations in order that rail grinding programs may be developed. The rail-corrugation analyser (RCA) has an accuracy range of plus or minus 0.002 in. With a non-contact electronic sensing device in a wear-resistant rail ski, irregularities up to 0.100 inch deep can be gauged.

Trottochau, LD (Loram Maintenance of Way, Incorporated) *Railway Track and Structures* Vol. 75 No. 10, Oct. 1979, pp 93-94, 2 Phot.

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01 303187
TRACK PROBLEMS POSED BY THE RUNNING OF HIGH SPEED TRAINS
Problems associated with running stability and track stability, vertical dynamic overloads, and the composition of the track for the new lines under construction are discussed and analyzed.

Prud'homme, A (French National Railways) *French Railway Techniques* Vol. 21 No. 1, 1978, pp 34-44

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01 303195
PERMANENT WAY MAINTENANCE
The subjects discussed deal with the determination of a maintenance policy; improvements in the design of the permanent way; adaptation of maintenance standards and methods of meeting the requirements; and the development of mechanized methods.

Cexus, M (French National Railways) *French Railway Techniques* No. 1, 1979, pp 33-39

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01 303209
CF&I EXPANDS, MODERNIZES RAIL MILL
The paper reports how capability of producing rails up to 82 feet in length, increased production capacity and improved quality and performance of output which are objectives of project involving a rail mill at Pueblo, Colorado.

Railway Track and Structures Vol. 75 No. 1, Jan. 1979, pp 22-25

ACKNOWLEDGMENT: EI
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01 303254
METAL SHAPER ON RAIL
Briefly described is a track maintenance machine which uses cutting heads to recontour rail, a supplement to grinding as a method of prolonging the life of rail. The Plasser machine processes both rails simultaneously with a combination of machining and grinding reducing the cycle time appreciably. By restoring rail head contour, further damage through shelling and irregular wheel action is avoided.

Progressive Railroading Vol. 22 No. 11, Nov. 1979, p 83, 3 Phot.

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

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01 303577
TRACK STRENGTH CHARACTERIZATION PROGRAM: AN OVERVIEW
This paper summarizes the background, accomplishments and scheduled test activities of the Track Strength Characterization program. Recent data from laboratory tests on a track section at the AAR's Track Structures Dynamic Test Facility and pilot studies of field measurement facilities are reviewed. Details of scheduled field characterization tests are outlined and the design of a field test vehicle reviewed.

McConnell, DP (Transportation Systems Center); Zarembski, AM (Association of American Railroads Technical Center); Lovelace, WS (Southern Railways) *AREA Bulletin* Vol. 81 No. 674, Sept. 1979, pp 1-30, 22 Fig., 7 Ref.

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01 303587
EGGS LAID IN KOLN SOFTEN TRACK NOISE
An elliptical cushioning unit incorporating an oval elastomer ring which functions in shear has been installed in a test section of the Cologne subway to combat transmission of noise to surrounding buildings and structures. The unit is mounted on the concrete tunnel floor and has the rail fasteners on its top. The so-called "egg track" was developed as an alternative to tracks which rest on heavy-duty concrete slabs that rest on springs on the tunnel floor. Vibration and sound dampening are claimed to be comparable at a much smaller cost.

Braitsch, H (Koln Transport Authority) *Railway Gazette International* Vol. 135 No. 12, Dec. 1979, p 1115, 2 Fig.

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01 303622
SUPERSTRUCTURE MAINTENANCE AS SEEN BY THE ENTERPRISE AS A WHOLE
Description of the new tasks conferred on the Permanent Way Department by the DB directorate and presentation of future objectives. [German]

Froehlich, P *Eisenbahningenieur* Vol. 30 No. 8, Aug. 1979, pp 336-349, 8 Phot.

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

01 303625
DB TRACK MAINTENANCE METHODS. PROGRESS IN DEVELOPMENT OF A NEW CONCEPT [Arbeitsverfahren zur Erhaltung der Fahrbahn bei der Deutschen Bundesbahn. Zum gegenwaertigen Stand einer Neukonzeption]
Mechanized track maintenance methods have developed rapidly over the last decades and are currently in a phase of consolidation. New processes have been adapted to achieve maximum efficiency so that each category of work requires a minimum number of processes. By reducing the number of methods and machines used, railways are continuing to reduce expenditure on track maintenance. [German]

Koerber, H *Die Bundesbahn* Vol. 55 No. 7, July 1979, pp 497-500, 2 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

01 303631
DESIGN OF REINFORCED ROADBEDS AND THEIR REPEATED LOADING TESTS
A brief summary of tests on a track bed composed of crushed stone, as compared with slag and sand. It was observed that under certain conditions the crushed stone roadbed provided better stability for the ballast.

Ito, T *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, 83 p., 2 Fig., 1 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

01 303638
LABORATORY MEASUREMENT OF PRESSURE DISTRIBUTION ON CROSS TIES BY THE TRACK [Labormessungen der Schienendruckverteilung auf die Schwellen]
In order to determine the optimum characteristics of cross ties it is important to know the distribution of external forces exerted on these sleepers. The article contains laboratory studies carried out on this subject and comments on various results obtained. [German]

Stanislaw, M *DET Eisenbahntechnik* Vol. 27 No. 8, Aug. 1979, pp 322-324, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

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01 303649
LATERAL WEAR OF RAILS ON CURVES
The development of new rail steels to reduce the cost of lateral wear in curved track would be significantly advanced if wear life could be predicted from laboratory results. A study of the wear of rails on curves reveals that material can be removed by a deformation and fracture mechanism. This type of wear process has been reproduced with a pin-ring wear testing machine and it is shown that the relative wear resistance of seven rail steels and the metallographic features observed correlate well with service experience. The way in which the wear data obtained could be used to establish the most suitable material property parameter for a wear life equation is discussed.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Clayton, P (British Rail)
Mechanical Engineering Publications Limited Conf Paper 1978, pp 83-90, 17 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

01 303660
RAILROAD BALLAST LOAD RANKING CLASSIFICATION
An investigation into the permanent deformation and degradation ranking (i.e., load ranking) of railroad ballast subject to laboratory repeated loading at a stress level comparable with those below North American heavy freight axle loads is reported. Some field data are also presented. Plastic deformations, change in grading, and production of fines are statistically linearly correlated with the aggregate physical characteristics. In general, the most significant physical characteristic is the aggregate hardness as measured by an autogenous grinding process termed Mill Abrasion. As the stress level increases above that related to railroad freight aggregate toughness as measured by the Los Angeles Abrasion becomes more significant.

Raymond, GP (Queen's University, Canada); Diyaljee, VA *ASCE Journal of the Geotechnical Engineering Div* Vol. 105 No. 10, Oct. 1979, p 1133, 19 Ref.

ACKNOWLEDGMENT: EI
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01 303672
OPTIMIZATION OF CVRD TRACK STRUCTURE
The 550-km Vitoria-Minas Railway (CVRD) in Brazil has had a four-fold increase in iron-ore traffic since 1967. In addition to double tracking and new alignments, CVRD is also increasing the strength of its track structure. This has involved welded rail, heavier rail sections and elastic rail fasteners. Now being investigated are use of concrete ties and special hardened, alloy and high-silicon steel rails. This paper presents all aspects of special rail tests and describes other measures already taken.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Collins, CT (Federal University of Minas Gerais, Brazil); Paula, EDB de Assis Arantes, T de (Federal University of Espirito Santo, Brazil)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 106 Pap A.3, 1978, pp 1-10, 10 Fig., 3 Tab.

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01 303673
25 YEARS OF HEAVY AXLE LOAD UNIT TRAIN OPERATION ON THE QUEBEC, NORTH SHORE AND LABRADOR RAILWAY
The practical effects of heavy axle loads and high gross annual tonnages over a 640-km heavy-duty railroad with unit train traffic in the sub-arctic region

of eastern Canada are discussed. Particular emphasis is given to disportionate shortening of rail life which occurs with a relatively small increase in axle loading. Major rail problems encountered are corrugation, shelling and horizontal split heads. The effects of these defects are accentuated during the 6-month winter when temperatures of minus 50 deg C are experienced. The QNS&L must determine if present-day rail steels are being operated near to, or above their economic load limits. Constant ultrasonic and electromagnetic induction testing, plus two or more major rail grinding campaigns annually are essential in a strict track maintenance program for assuring safe and efficient operation of such a railroad.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Bramwell, S (Nederland B.V., Australia); McElroy, TF (Quebec North Shore and Labrador Railway, Canada)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 107 Pap A.4, 1978, pp 1-5

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01 303695

PROBABILITY ANALYSIS OF RAIL DEFECT DATA

Rail defect data from six locations on American railroads are summarised and analysed using Weibull probability distributions. A fivefold difference in rail sites was found to be statistically significant. Rail defect life was found to vary with the forth power of stress which explains high defect rates in lighter rail under the same loading conditions. Equations for defect occurrence as a function of traffic and stress are given.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Besuner, PM (Failure Analysis Associates); Stone, DH Schoeneberg, KW (Association of American Railroads); Herrera, MA DE (Failure Analysis Associates)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 308 Pap I.4, 1978, pp 1-9, 11 Fig., 3 Tab., 10 Ref.

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01 303698

A RESEARCH TRIP FOR THE STUDY OF AXLE LOAD

In developing Brazil's Carajas Project it became apparent that rail life is of paramount importance in designing iron ore railways. A group from the Project and its consultants visited Africa, Australia, South America and Canada. It was confirmed that rail life is a function of axle load; that with heavy axle loads the annual costs of track maintenance have been high enough to warrant a reexamination of the assumption that economics favor specification of the largest capacity equipment available. For the Carajas Project a 27-ton axle load on 38-inch wheels was specified. Additional recommendations involved compaction and width of subgrade, high-quality drainage, curve superelevation based on loaded trains, control of lading so car axle load limits will not be exceeded, adoption of elastic rail fasteners, welded rail and a comprehensive track maintenance program.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Lucca Silva, L de Nobrega, ML
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 312 Pap I.9, 1978, pp 1-12, 4 Fig., 2 Tab.

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01 303699

PERFORMANCE OF HIGH STRENGTH RAILS IN TRACK

The problem of rapid deterioration of the standard AREA carbon rail under the operating conditions on the Mt. Newman track has necessitated the development and testing of high strength materials. An extensive in-track assessment programme, utilizing selected sections of track with varying physical characteristics, is being conducted to evaluate the relative performances of the different rail types. These are monitored at regular intervals and the results will provide the necessary data which will enable a final assessment to be made on an economic basis. Because of the long-term trials involved in obtaining such data, the programme was designed with sufficient flexibility to allow for any factors which could change its direction or objectives.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Curcio, P Marich, S (BHP Melbourne Research Laboratories, Australia); Nisich, GL (Mt. Newman Mining Company Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 313 Pap I.10, 1978, pp 1-13, 13 Fig., 6 Tab., 8 Ref.

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01 303702

TRANSPOSING AS A MEASURE TO COMBAT HUNTING

Transposition of rail is a method commonly used to prolong rail life in curves where gauge face wear on the high rail has exceeded safety standards. At Mt. Newman Mining Co. it has been used as an integral part of track maintenance on tangent track where hunting motions of ore car bogies in low speed unit trains have resulted in excessive gauge face wear. Various methods of transposing are available where track occupation for maintenance is extremely limited.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Nisich, GL Oliver, BD (Mt. Newman Mining Company Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 316 Pap I.11, 1978, pp 1-6, 6 Fig., 2 Ref.

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01 303703

FROGS & SWITCHES FOR HEAVY HAUL RAILWAYS

Thompsons-Byron Jackson has supplied Australia's heavy-haul iron-ore railways with 455 turnouts in three rail sizes and with both railbound and solid frogs. This paper outlines developments resulting from cooperation between Western Australia's iron ore railroads and the steel producer in an endeavor to overcome problems that have evolved.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Billman, RR (Thompsons-Byron Jackson, Australia); Jones, DH (Davies & Baird); Thomas, RC (Thompsons-Byron Jackson, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 317 Pap I.12, 1978, pp 1-8, 3 Tab., 1 Ref.

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01 303706

OPTIMISATION OF CONCRETE TIE DESIGN

Experimental data and theoretical argument are presented to show that the optimum length for a concrete tie of uniform cross-section is 1.67 times the distance between the two rail centrelines. A design methodology is presented and evaluated on available data on in-track performance. It is shown that the design rail seat bending moments specified for large spacings by the American Railway Engineering Associations' Concrete Tie Committee,

which are based on 40 kip static wheel loads, are questionable. This under-design is even more critical for the centreline values.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Raymond, GP (Queen's University, Canada)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 404 Pap J.2, 1978, pp 1-7, 10 Fig., 1 Tab., 8 Ref.

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01 303709
TOWARDS THE DESIGN OF RAIL TRACK FOR HEAVY AXLE LOADS

Historically railway track design has been based upon experience, empirical equations and simplified theoretical models. Despite the deficiencies inherent in these procedures they may be utilized to form a preferred design approach for heavy axle load conditions. This paper will discuss the available methods, their applicability, and their limitations. In the long term, however, newer models which incorporate a design-maintenance interaction are necessary for the development of a cost optimum track. As a step in this direction, the prediction of ballast deformation under repeated loading, a factor not considered in present design procedures, is examined.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

O'Rourke, MD Mair, RI Doyle, NF (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 407 Pap J.3, 1978, pp 1-12, 18 Fig., 3 Tab., 45 Ref.

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01 303710
TRACK COMPONENT DEVELOPMENT, HAMERSLEY IRON RAILWAY

Since construction of the original track in 1966, track components have undergone continuous refinement. The original design did not anticipate today's high tonnage and involved theories and materials available at that time. All components from rail through fasteners and ties to the ballast have since been subjected to continuous heavy-axle-load unit train operation. Deficiencies in the original design have required many alterations and upgrading programs to cope with the problems encountered. The paper traces the history of Hamersley's track and indicates how it has been modified to handle an annual density of over 50 million gross tons.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Geddes, NR Longson, BH Dwyer, PJ (Hamersley Iron Pty Limited, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 408 Pap J.4, 1978, n.p.

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01 303714
FORMATION OF SHORT PITCH CORRUGATIONS IN RAILS

Presented is a theory explaining the formation of short-pitch corrugations in rails based on residual stresses caused by manufacturing and changed under traffic by load stresses which lead to a flow process with a visco-elastic effect in zones near the edge.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Eisenmann, J (South African Railways)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 413 Pap I.6, 1978, pp 1-6, 10 Fig., 15 Ref.

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01 303715
TRACK STRUCTURE--OPTIMISATION OF DESIGN

A design procedure based on classical theories, permissible stresses and qualitative and quantitative performance correlations, as used by the South African Railways, is explained. Track structure running top performance is evaluated as a function of ballast and formation stresses and traffic. Different traffic mixes are reduced to a common denominator of equivalent theoretical traffic in terms of a reference axle load. The latter concept is in need of quantitative, practical evaluation.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Lombard, PC (South African Railways)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 414 Pap B.5, 1978, pp 1-9, 10 Fig., 3 Tab., Refs.

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01 303716
A MODEL OF THE PHYSICAL AND ECONOMIC PERFORMANCE OF RAIL IN MAIN LINE TRACK

The widespread adoption of heavy cars has dramatically reduced the span and predictability of rail service life. It has become increasingly apparent that, in the absence of reliable empirical evidence, rail life estimates must be based upon an array of traffic and track variables, and must be both route-and service-specific. In view of the complex interactions of wear mechanisms acting on the rail, computer simulation holds the greatest potential for rail life estimation. This paper reports the development of such a model for engineering decision and costing applications. The model converts a traffic mix over a specific track section into a signature of contact and internal stresses in the rail, then uses theoretical/empirical wear models to estimate the rate at which the rail metal will be abraded and will deform plastically, and the rate at which transverse defects will initiate and propagate. On the basis of these rates and specified condemnable limits, a rail life is projected. The service life penalty resulting from the conveyance of an element of traffic over a given track segment is converted to a charge reflecting the "consumption" of the rail asset. Consequently the model can be used to estimate incremental costs for many applications. Similarly, as the model accounts for the effects of a large number of variables, economic benefits attributable to track design or equipment changes can be assigned. Details of the wear models used in the programme are presented. Examples include comparisons of predicted versus actual rail life realisations on two Canadian heavy haul rail lines sample costing and engineering applications.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Roney, MD Turcot, MC Lake, RW (Canadian Institute of Guided Ground Transport)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 415 Pap B.6, 1978, pp 1-8, 5 Fig., 1 Tab., Refs.

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01 303717
SOME ASPECTS OF THE PROBLEM OF RAIL CORRUGATIONS

Investigations into corrugations on the rails of the New Zealand Government Railways indicate that rail vibration frequencies and accelerations are consistent with formation of corrugations by plastic deformation of the rail metal. X-ray diffraction measurements show that residual stresses of the

order of the ultimate compressive stress of the steel are present in the rail head. Physical measurements show that the wheels appear to follow the corrugation profile into which the wheel profile can fit. The effect of flash butt welds and very wet conditions are briefly considered.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Taylor, JBC (Canterbury University, New Zealand); Crawley, AM (New Zealand Government Railways)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 416 Pap I.7, 1978, pp 1-7, 6 Fig., 2 Tab., 9 Ref.

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DOTL RP

01 303718
THE CHARACTERISTICS AND CONTROL OF LONG PITCH RAIL CORRUGATION AT HEAVY AXLE LOADS

A study of the spectral content of rail corrugation profiles is correlated with spectral analyses of dynamic records of track and ore car vibrations. A correspondence is established between track/vehicle resonance frequencies and the dominant corrugation pitches. It is concluded that corrugation development is best controlled by the use of high strength rails. Reliability analysis is applied to determine the required strength levels for different wheel load/wheel diameter combinations relevant to unit ore trains.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Mair, RI (BHP Melbourne Research Laboratories, Australia); Jupp, RA (Mt. Newman Mining Company, Australia); Groenhout, R (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 417 Pap I.8, 1978, pp 1-9, 12 Fig., 2 Tab., 24 Ref.

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01 303724
PRACTICAL AND ANALYTICAL STUDIES INTO TANGENT TRACK RAIL WEAR AT MT. NEWMAN MINING

Heavy wear of tangent track in an alternating pattern has been a problem on Mt. Newman Mining's Railroad for some time. In this paper the worn areas are described and the mechanism of their formation is discussed. Maintenance procedures which have temporarily reduced the severity of the problem are mentioned. In an attempt to find a long term solution a research program has been undertaken. The program includes experimental studies of the bogies and track and the development of an analogue computer based bogie model. The preliminary results of these studies are presented.

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Jupp, RA (Mt. Newman Mining Company, Australia); Baxter, GL (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Paper X.2, 1978, pp 1-10, 14 Fig., 2 Tab., 20 Ref.

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01 303725
THE DEVELOPMENT OF A STEEL SLEEPER SYSTEM FOR HEAVY HAUL RAILWAYS

This paper deals with the design and testing of a steel sleeper for use under 35 tonnes axle loads, where up to 90 MGT is transported annually. The design is based principally on a fatigue analysis in which the sleeper is considered as a beam with welded abutments and subsequently as a beam on elastic foundation. Consideration is taken of dynamic effects, the distribution of axle load into a group of sleepers and the different ranges of load on a sleeper. Other factors which are discussed include provision of cant and of longitudinal restraint, centre binding and vertical track buckling. Laboratory fatigue testing of the sleeper undertaken to provide a basis for evaluating and improving design. Various rail fasteners and insulation systems for use under high axle load conditions were developed and evaluated.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Brown, JH Skinner, DH (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Paper X.3, 1978, pp 1-10, 17 Fig., 1 Tab., Refs.

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

DOTL RP

01 303727
MODERN MAINTENANCE OF POINTS AND CROSSINGS

Points and crossings are the weakest components of track structures. For heavy-haul railways maintenance of points and crossings is at least as important as for high-speed operation. New machinery can carry out track maintenance with great accuracy and minimum track occupancy at minimum cost. New methods have been developed to meet even difficult conditions successfully.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Riessberger, K
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Paper X.5, 1978, pp 1-5, 3 Ref.

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

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01 303851
INTERMEDIATE SHOULDER-CLEANING TO AID DRAINING THE CONSOLIDATED BALLAST BED

Rail-mounted machines embodying bucket excavation with conveyors and screen-reclaimed stone return, to clean and remake the track shoulders. Developed by Plasser & Theurer, such a technique avoids disturbance to the consolidated cribs and load-carrying formation, to preserve the latter but open up the cribs as well, a Windhoff ballast crib excavator is also in service which enables the crib and shoulder to be remade if required.

Rail Engineering International Vol. 8 No. 2, Apr. 1979, pp 60-61

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

01 303852
LABORATORY MEASUREMENTS OF THE DISTRIBUTION OF THE PRESSURE IN SLEEPERS

For the calculation of railway sleepers it is necessary to know the distribution of the rail pressure, which is the result of the external forces at the rail. In the paper presented the laboratory measurements of the distribution of the static rail pressure in a sleeper are described, which were made to compare them with the results of mathematical models. The physical model of the measurements, the devices to measure, the action of the forces to the sleeper (supports) and some measuring results are dealt with. The influence of failures of individual supports to the distribution of pressure has been especially investigated. [German]

Mazur, S *DET Eisenbahntechnik* Vol. 27 No. 8, Aug. 1979, pp 322-324

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

01 304666
TRACK RENEWAL SYSTEMS: A SURVEY REPORT
This report presents a survey of track renewal machines and track renewal systems in Europe and North America. Topics covered include a brief history of track renewal, traditional North American selective track maintenance, and each of the major track renewal machine types currently in use. Emphasis is given to the Canron P-811-based system: P-811 operations are described in detail, including direct observations of the machines operating in Italy and on the Northeast Corridor. Also included are reviews of three recent studies of the economics of track renewal systems for U.S. railroads. The studies used different scenarios and therefore produced different results. However, each study did forecast a positive rate of return on the investment required for track renewal systems to replace selective maintenance methods. The report concludes with a brief account of each of the seven major issues that affect the economics of track renewal but that have yet to be studied in detail.

Cataldi, GR Elkaim, DN Larsen, KW
Unified Industries, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-79/43, July 1979, 27 p.

Contract DOT-FR-8046

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300866/1ST, DOTL NTIS

01 304715
A THEORY FOR TRACK MAINTENANCE LIFE PREDICTION
Track maintenance life is a complex function of many factors. This report is concerned with a study to define a theoretical model for predicting track settlement under dynamic load, which is applicable to estimating maintenance life for railroad track structures. The behavior of each component of the track system is described to represent the progressive permanent settlement under vehicle loading. Ballast, subballast and subgrade materials are considered to be the primary components contributing to the permanent settlement. Test procedures and apparatus have been developed for determining the required properties. An evaluation of the available computer models for track analysis is made by validating their predictions with field measurements obtained from the FAST site in Colorado. Methods of predicting permanent deformation under repeated loading are reviewed, and a method which accounts for stress path is proposed.

Selig, ET Chang, CS Adegoke, CW Alva-Hurtado, JE
State University of New York, Buffalo, Department of Transportation Final Rpt. DOT/RSPA/DPB-50/7922, Aug. 1979, 199 p.

Contract DOT-OS-70058

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-301316/6ST, DOTL NTIS

01 304805
WOOD TIE REUSE: A SURVEY REPORT
This report presents a survey of wood tie reuse associated with track renewal in North America and Europe. Topics covered include the causes of tie deterioration, the technology of tie repair, and a survey of wood tie reuse practices in France, Italy, West Germany, Great Britain, the U.S.S.R., and the United States. Also included is a discussion of the economics of wood tie reuse, consisting principally of reviews of the wood tie reuse aspects of two recent U.S. studies. One study focused on the potential of track renewal as an alternative to selective maintenance and the other study examined the technical and economic feasibility of using repaired ties in lieu of new ties when replacing defective ties. Although these studies are neither wholly comparable nor comprehensive, they do provide perspective on the potential costs and benefits of wood tie reuse. All in all, based on these studies and other information, it appears that the economics of tie reuse is promising and that used ties have a potential role to play in track maintenance in North America.

Cataldi, GR Elkaim, DN Larsen, KW Elliott, P
Unified Industries, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-79/44, UII-92104-2, Aug. 1979, 25 p.

Contract DOT-FR-8046

ACKNOWLEDGMENT: NTIS
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PB80-114044, DOTL NTIS

01 307645
INVESTIGATION OF A PLATE INDEX TEST FOR RAILROAD BALLAST
Laboratory tests were first conducted to determine the effects of the following variables: ballast type, ballast density, ballast layer thickness, plate seating method, plate size, plate shape, and repeated load cycles. The procedures developed were also successfully field-tested. The study showed that using a 127-mm (5-in.) diameter plate with plaster of Paris as a seating material gave the most consistent results. The derived index parameters were found to be significantly affected by all of the variables considered.

Panuccio, CM (State University of New York, Buffalo); Wayne, RC Selig, ET *Geotechnical Testing Journal* Vol. 1 No. 4, Dec. 1978, pp 213-222, 9 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 307646
APPARATUS AND PROCEDURES FOR A RAILROAD BALLAST PLATE INDEX TEST
A small field plate bearing test was developed in response to a need for a method for measuring the physical state of railroad ballast. The recommended apparatus and procedures for this test are described in this paper. They evolved from a laboratory investigation of the variables influencing the test and field experience at a variety of track sites.

Panuccio, CM (State University of New York, Buffalo); Dorwart, B Selig, ET *Geotechnical Testing Journal* Vol. 1 No. 4, Dec. 1978, pp 223-227

ACKNOWLEDGMENT: EI
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01 307656
TRACKAGE HANDBOOK: ENGINEERED PERFORMANCE STANDARDS: PUBLIC WORKS MAINTENANCE
No Abstract.
Supersedes NAVDOCKS P-714.0, January 1961.

Department of the Navy Reprint 1977, 52 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

01 307662
THE NEXT 75 YEARS: HOW WILL THE SAVINGS BE MADE?
In conjunction with this publication's 75th anniversary, this article examines the possibilities for developments in machinery and track structures.

Railway Track and Structures Vol. 75 No. 12, Dec. 1979, pp 50-51

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01 307663
MATCHING M/W PRACTICE TO REQUIRED USE OF TRACK--PART III--RAIL
The 100-ton car has changed the criterion for rail renewal from ordinary wear to contact stress failure. Without work-hardening of the heads which took place when a high proportion of small cars were passing over newly laid rail, contact stresses are now a major problem limiting rail life. Changes in rail head design can reduce these stresses. Rail renewal should be based on ultrasonic tests, supplemented by physical inspection. Recommendations on jointed rail, continuous welded rail and relay conclude this installment.

Ahlf, RE (Illinois Central Gulf Railroad) *Railway Track and Structures* Vol. 75 No. 12, Dec. 1979, p 55, 5 Phot.

ORDER FROM: ESL

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01 307688
DETERMINATION OF STRESSES EXERTED ON SWITCH FROGS BY WHEELS [Zur Ermittlung der Spannungen im Radueberlaufsbereich von Herzstueckspitzen]
Switch frogs are subject to very high stresses by the wheels which travel over them, and these stresses result in specific wear phenomena. In addition to damage to the actual substance and plastic distortion, cavities and rough

patches are often found on the surface of switch frogs. To avoid damage, the quality of steel must be carefully selected, and in particular special consideration must be given to measures which need to be taken at the time when the points are being constructed. An important criterion for decision is the most accurate knowledge possible of the maximum stress expected on this part of the point.

Fischer, FD *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 597-602, 9 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

01 308270
THE KANSAS TEST TRACK PART I--ANALYSIS OF TEST DATA
This report presents the results of an experimental project to compare the performance of different track support systems. Data obtained during the project are summarized, presented, and analyzed. Based on these data, conclusions are made regarding the performance of the different track support systems. Details of instruments used for data measurement, their location in track, test procedures, and test data are presented in Part II of the report.

Ball, CG Hanson, NW Weber, JW
Portland Cement Association, Federal Railroad Administration Final Rpt. FRA/ORD-79/22.I, Nov. 1979, 132 p., 49 Fig., 35 Tab., 10 Ref.

Contract DOT-FR-90043

ORDER FROM: NTIS

PB80-128390, DOTL NTIS, DOTL RP

01 308271
THE KANSAS TEST TRACK PART II--APPENDICES
This report presents data obtained from an experimental project to compare the performance of different track support systems. Also, it describes instruments used for data measurement, their location in track, and test procedures. Analysis and evaluation of test data are presented in Part I of the report.

Ball, CG Hanson, NW Weber, JW
Portland Cement Association, Federal Railroad Administration Final Rpt. FRA/ORD-79/22.II, Nov. 1979, 159 p., Figs., Tabs., 6 App.

Contract DOT-FR-90043

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01 308272
MECHANICAL IMPEDANCE EVALUATIONS OF THE KANSAS TEST TRACK: PRETRAFFIC AND POSTTRAFFIC TESTS
The Kansas Test Track (KTT) was comprised of nine different track systems whose dynamic response was measured in two series of impedance tests. Pretraffic impedance testing was done in 1973, before the KTT was opened to traffic, and a second (Posttraffic) test series was carried out in 1975 after the KTT had experienced premature failure in service. Results of these tests, presented in the form of impedance and velocity transfer ratio plots, have been used to characterize the various KTT track systems according to their initial dynamic stiffness and component behavior. Known limitations of the test apparatus precluded a detailed analysis; however, a linear idealization was developed to grossly model track system response. These results illustrate the feasibility of an impedance approach to the structure-ballast-interaction processes which govern track system performance.

Cooper, SS
Waterways Experiment Station, Federal Railroad Administration Final Rpt. FRA/ORD-79/10, Nov. 1979, 167 p., 116 Fig., 5 Tab., 12 Ref.

Contract DOT-AR-30025

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01 308273
POSTMORTEM INVESTIGATION OF THE KANSAS TEST TRACK, VOLUME I
The Kansas Test Track (KTT) was comprised of nine different track systems, which were built on a designed embankment. The KTT subgrade experienced premature failure in service, and KTT operations were terminated in June 1975 after six months of operation. A postmortem investigation of KTT was carried out in 1975 and 1976. Volumes I and II document the structure, ballast, and embankment studies carried out by the U. S. Army Engineer Waterways Experiment Station in the postmortem investigation. Results presented in Volume I provide needed insight into track system behavior and are particularly descriptive of ballast and embankment performance. A rationale is presented to explain the mechanism of failure in the subgrade, and attention is drawn to the structure-ballast-subgrade interaction processes which govern track system performance. Inadequate drainage of the top of the KTT embankment led to moisture content increases in the top of subgrade from 1971 to 1974, when traffic commenced. The embankment clay was moderately to highly plastic, and moisture-induced loss of strength in the top few inches of subgrade was the principal cause of failure.

Cooper, SS Bush, AJ, III Greer, HC, III Vispi, MA Carlson, MM
Waterways Experiment Station, Federal Railroad Administration Final Rpt. FRA/ORD-79/09.I, Nov. 1979, 130 p., 75 Fig., 13 Tab., 18 Ref.

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PB80-138316, DOTL NTIS, DOTL RP

01 308275
TRACK COMPONENT--PROPERTY TESTS VOLUME I--RAIL, TIE AND FASTENERS
This report describes the test procedures and the results of tests on the physical properties of rail, tie and fastener. The properties obtained are the bending rigidity of the tie, bending rigidity of the rail in both the vertical and lateral planes, and the fastener resistance to rotation about the vertical axis. The component tests were run on two rail sections, 115 lb RE and 136 lb RE, on 7"x9"x81/2" gum ties and on three fastener configurations on the two different rail sections. The tests were conducted at the Association of American Railroads (AAR) Track Structures Dynamic Test Facility in Chicago, Illinois.

Zarembski, AM Choros, J Gitlin, I
Association of American Railroads Technical Center, Federal Railroad Administration Intrm Rpt. FRA/ORD-79/32, Nov. 1979, 54 p., 24 Fig., 10 Tab., 5 Ref., 2 App.

Contract DOT-FR-30038

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PB80-142367, DOTL NTIS, DOTL RP

01 308281
RESEARCH AND OPERATIONAL TESTING OF NEW TYPES OF SELF-HARDENING STEEL [Untersuchung und betriebliche Erprobung neuartiger naturharter Schienenstaehle]
As part of the rail/wheel research project, different types of steel have been studied to test their suitability for use as self-hardening rail steel. Since 1974, experiments have been conducted on rails including four different groups of metals, laid on lines in normal service, for the purpose of measuring wear resistance, crushing, fatigue, scratching, tensile strength and performance of the welds. [German]

Heller, W Schweitzer, R *Krupp Tech Mitteilungen, Forschgs ber u Werksber* Vol. 37 No. 3, 1979, pp 79-87, 2 Tab., 15 Phot., 14 Ref.

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

01 308290
HISTORY AND FUTURE OUTLOOK OF TRACK MAINTENANCE OF SHINKANSEN
With the aim of studying track structures and track management methodology, tests were started in 1962 on an experimental track, using vehicles running at 210 km/h, a speed which had never been reached before. Even after the opening of the line, particular efforts have constantly been made with regard to maintenance, so as to keep the lines up to the highest standards required. When laying the extension of the line to Hakata, the use of concrete slab track instead of ballast has enabled JNR to make considerable savings in maintenance costs.

Miyamoto, T *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 16-19, 2 Fig., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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01 308293
REMOVAL OF BROKEN SLEEPER SCREWS FROM WOODEN SLEEPER PLUGS [Entfernen abgebrochener Schwellenschrauben aus hoelzernen Wellenduebeln]
During the service life of prestressed concrete sleepers, maintenance or renewal of the wooden sleeper plugs is indispensable. In connection with this work, great difficulties arise in removing broken sleeper screws. The engineering Bureau for the Rationalisation of Railway Construction has developed a process which has never been used before, under its research and development programme. [German]

Kahnt, W Rathmann, W *Signal und Schiene* Vol. 23 No. 5, 1979, pp 221-223, 5 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13/14, Postfach 1235, 108 Berlin, East Germany

01 308294
THE PROBLEM OF COATING SLEEPER PLUGS [Problematik der Duebeltauchung]
Maintenance of minimum resistance in the ballast for track circuits in the case of tracks with prestressed concrete sleepers makes it necessary to use insulating sleeper plugs. Insulating plugs are made of wood coated with a resin-and-filler mixture before being inserted in the concrete sleepers. The writer describes climatic and atmospheric conditions for drying the untreated plugs and hardening after coating. [German]

Geschke, M *Signal und Schiene* Vol. 23 No. 5, 1979, pp 225-226, 1 Fig., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13/14, Postfach 1235, 108 Berlin, East Germany

01 308299
MOTOR SET FOR REPAIRING POINTS AND TRACK SECTIONS [Maschinensatz zum Umbau von Weichen und Gleisjochen (UWG)]
The DB has 4 motorized units for repairing switches and track sections; these are located in track construction workshops. Each set comprises 6 levers and hydraulic point-trolleys, together with various ramps and other parts needed for the track-bed. Track repair with the aid of these units means that while special maintenance work is in progress on switches, traffic can be maintained on adjacent tracks. [German]

Ehret, E *Deine Bahn (DB)* Vol. 7 No. 10, 1979, pp 599-603, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Eisenbahn-Fachverlag, Am Linsenberg 16, 6500 Mainz, West Germany

01 308301
TRACK/BRIDGE INTERACTION PHENOMENA UNDER THE EFFECT OF CHANGES IN TEMPERATURE IN CASES WHERE LONG WELDED RAILS ARE USED [Phenomene d'interaction "voie-ouvrage d'art" sous les effets de variations de temperature dans le cas de pose de voie en longs rails soudes]
When long welded rails are used on bridges, track/bridge interaction phenomena occur under the effect of changes in temperature and because of different rates of expansion. The authors study the laws governing friction between the rail and the track bed using theoretical models and they describe the test checks; these laws can be used to calculate the maximum length of expansion beyond which track should have special expansion fittings. [French]

Gandil, J Voignier, P *Revue Generale des Chemins de Fer* Oct. 1979, pp 473-488, 5 Tab., 8 Phot.

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

DOTL JC

01 308303
WHY NORTH AMERICA IS MOVING TOWARDS COMPLETE RENEWAL OF TRACK
The traditional practice of replacing track components as they wear out is being superseded by mechanized renewal on European principles. The main problems are use of staggered joints and the spike.

Burns, DR *Railway Gazette International* Vol. 135 No. 10, Oct. 1979, pp 894-898, 1 Fig., 1 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

01 308435
THE GERMAN FEDERAL RAILWAY'S S.54 SWITCH POINTS
In 1979 the DB installed for the first time about 100 switch points made of S54 rails, thus following the trend to heavier types of switches so as to carry heavier loadings than in the past and to reduce the extent of the increasingly difficult track maintenance work. A time schedule has been drawn up for almost all existing S49 switch point types in which after the end of 1982 the usual forms and then the less common but indispensable forms are to be developed. The concept for the transition from the S49 to the S54 provides that initially all switches of the 1st order be built with S54 rails. The requirements for the new switches have been agreed with all interested parties. They must permit a speed of 200 km/h on the main or through line and must support axle loadings of up to 22 tonnes. The design takes account of experience gained with the highly-loaded and frequently fast-run UIC 60 switch points and the successful S49 types used for decades on tracks of all kinds. Outside dimensions, the 1.435 mm gauge and the vertical rails are as for the S49 switch point, but the sleeper spacing has been reduced to 60 cm, which has a considerable effect on the detail design. In view of the very widely varying requirements, two different check-rail designs will be used alongside each other for a time until operating experience permits standardization. In view of supply difficulties with long wooden sleepers, steel sleeper sets are in preparation for some S54 switch types, while the planning of concrete sleepers for switches is in progress. [German]

Morgenschweis, O *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, p 651

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

DOTL JC

01 308436
INFLUENCE OF SLEEPER FORM ON THE LATERAL RESISTANCE OF THE TRACK UNDER LOAD
Three types of sleeper used in Austria have been tested on behalf of the construction department of the Austrian Federal Railways with respect to their ability to transmit horizontal forces to the ballast when under load. Only one condition of track was examined for the different forms of sleeper. Stabilized tracks naturally give higher values, but basically there would be no difference in the results apart from parallel displacement of the lines. For all sleeper forms described the relationship between vertical load P and the lateral resistance of the track R is linear. It is shown that the ears of the ear sleepers are effective even at very small track displacements--in this case 0.1 mm--whereas the greater length of the longitudinal sleepers has no effect. It is emphasized that particularly in the case of low vertical loads (where the lateral resistance has hitherto been too small), a particularly large increase in lateral resistance has been achieved by the ears of the ear sleepers. The given practical examples show that the ear sleepers lie very stable in the track and require little maintenance if the formation is good and the rail connections are adequately dimensioned. [German]

Klugar, K *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, pp 683-685

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

DOTL JC

01 308437
RAIL CORRUGATIONS RESULTING FROM ULTRASONIC FREQUENCY VIBRATIONS IN THE RAIL HEAD
The ultrasonic frequency vibrations produced in the head of a rail each time the wheels roll over a crest of roughness will persist over a certain

reverberation time. Reasons are given for the fact that during the reverberation stationary waviness of the vibration amplitude occurs along the rail and become impressed in the rail if the wheel rolls fast enough. This "impression" occurs through a more or less ordered formation of fictional martensite strips or spots and islands of corrosion. Much rolling over initially strongly differentiated impressions leads increasingly to large-area structures with increasing differences in height in the longitudinal direction until the final discrete corrugated spots result at intervals which have a spread of about 2 to 3 cm about an average which depends on the dimensions of the rail head. Recordings of the frequency of occurence of the corrugation intervals show a clear correlation with the height of the rail head. [German]

Werner, K *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, p 687

ACKNOWLEDGMENT: British Railways
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany
DOTL JC

01 308438
NEW TRACKED CONSTRUCTION MACHINERY

The development of tracked construction machinery for the upkeep of the permanent way has reached such a level that especially railways with a high degree of mechanization are engaged on improving work procedures and the employed machines to meet changed production conditions and to improve performance and work quality. Only machines built to the type rules with special reference to ergonomic features, noise protection and work safety can pass the acceptance tests. The present assessment level of 90 dB(A) for machine operators exposed to continuous noise can be less on machines with enclosed operators' cabins. The additional investment for noise-protection measures is about 2.5 to 5 per cent of the machine investment cost. The 08 series of track and sleeper tamping machines is the most advanced to date with respect to performance and quality of work. The ballast regulators Type SSP 100 and ballast profiling machines Type SK 73.1 show additional economical solutions for combatting noise. [German]

Riebold, K *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, p 659

ACKNOWLEDGMENT: British Railways
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany
DOTL JC

01 308439
USE OF INSTRUMENTATION AND COMPUTERS FOR SURVEYING TRACK CURVES

About seven years ago the DB again began to set out observation points at track curves so as to have a simple means of checking their accuracy and making corrections where necessary. The survey department determines the co-ordinates for the observation points and for individual points on the track, while rises are calculated at 5-metre intervals. In order to carry out the survey work within the required time schedule with the necessary accuracy, use is made of the most modern instruments and computers which have undergone great advances as a result of the expansion of electronics in the last ten years. This has achieved the objective of automatic data flow. In addition to the electronic aids, use is also made of mechanical equipment which simplifies the site work particularly in respect of the high level of accuracy required. [German]

Siems, E *Eisenbahntechnische Rundschau* Vol. 28 No. 9, Sept. 1979, p 695

ACKNOWLEDGMENT: British Railways
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany
DOTL JC

02 053334
BRAKING AND STARTING FORCES ON BRIDGES AND INTERACTIONS BETWEEN TRACK AND BRIDGES. THEORETICAL STUDIES AND CALCULATIONS CONCERNING THE EFFECTS OF LONGITUDINAL FORCES ON TRACKS AND BRIDGES DUE TO STARTING AND BRAKING
The report describes studies carried out by OBB abd relating to the effect of horizontal forces on tracks and bridges. The differential equation for the horizontally loaded track is solved in closed form and a computer program for calculating the rail forces at the ends of the support structure is given. Theory is compared with test results. The governing influence of the track itself on the magnitude of the longitudinal rail forces above the bearings is confirmed.

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

International Union of Railways D 101/RP 14, Apr. 1979, 62 p., 22 Fig.

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02 197596
SDP-40F/E-8 LOCOMOTIVES. TEST RESULTS REPORT. DYNAMIC PERFORMANCE TESTING. VOLUME I
This volume covers a test on the Chessie System to collect as much data as possible on parameters suspected of causing SDP-40F derailments. A baseline locomotive, the E-8, considered a stable performer by professional railroad personnel was introduced into the tests for comparison purposes. Also, the SDP-40F was modified to simulate various stages of wear and states of maintenance, and tested after these modifications for comparison with tests run on a locomotive in "like-new" condition.

See also Volume 2, PB-296 295.

Kesler, K Yang, TL
ENSCO, Incorporated, Federal Railroad Administration FRA/ORD-79/11-1, ENSCO/DOT-78/10/1, Sept. 1977, 44 p.

Contract DOT-FR-64113

ACKNOWLEDGMENT: NTIS
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PB-296294/2ST, DOTL NTIS

02 197597
SDP-40F/E-8 LOCOMOTIVES. TEST RESULTS REPORT. DYNAMIC PERFORMANCE TESTING. VOLUME II
This volume is a series of five appendices covering details of the Chessie System Test. These are: Appendix A-SDP-40F Consist Instrumentation (AAR); Appendix B-E-8 Consist Instrumentation (ENSCO, Inc.); Appendix C-Trackside Measurements of Wheel/Rail Forces (Battelle Columbus Laboratories); Appendix D-Locomotive Wheelset Instrumentation and Calibration (HITEC Corporation); and, Appendix E-Probabilistic Analysis for Locomotive Derailment (J H Wiggins Company).

See also Volume 1, PB-296 294.

Kesler, K Yang, TL
ENSCO, Incorporated, Federal Railroad Administration FRA/ORD-79/11-2, ENSCO/DOT-78/10/2, Sept. 1977, 173 p.

Contract DOT-FR-64113

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-296295/9ST, DOTL NTIS

02 198038
DYNAMIC ANALYSIS TO ESTABLISH NORMAL SHOCK AND VIBRATION OF RADIOACTIVE MATERIAL SHIPPING PACKAGES
A new calculation sequence was developed to simulate the behavior of the coupler subsystem for the cask-rail car (hammer car) and the lead car in the group it impacts (struck car) during humping operations. This new coupler submodel simulates the hysteresis-type behavior of friction draft gears. Friction draft gears consist of springs and dampers in parallel rather than the series arrangement upon which the previous calculation sequence was based. Results from this submodel compare well with experimental results for friction draft gears in their "active" state during impact (before bottoming out and during recoil). This coupler submodel will now be incorporated into the full cask-rail car model.

Fields, SR Mech, SJ
Hanford Engineering Development Laboratory, Nuclear Regulatory Commission Prog Rpt. HEDL-TME-78-102, NUREG-CR-0589, Mar. 1979, 43 p.

Contract NRC-60-78-254

ACKNOWLEDGMENT: NTIS
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PB-293660/7ST

02 198180
A MULTIPURPOSE TRAIN PERFORMANCE CALCULATOR
This computerized model is a train performance calculator (TPC) program which simulates the operation of a passenger train over a rail route. The input for the program is the track data for the route, the characteristics of the locomotive, the type and number of cars, and the number of passengers. The output from the TPC is in the form of tables showing speed, time, and fuel used; and in the form of graphs showing speed, time, and fuel used versus distance travelled. The TPC has been in use for two years to study the energy intensity of AMTRAK trains in the New York to Buffalo corridor...Software Description: The program is written in the BCL programming language for implementation on a Burroughs B5700 computer using the MCP MARK XVI.0.178 operating system. 96K bytes of core storage are required to operate the model.

Source tape is in BCL character set. Character set restricts preparation to 7 track, one-half inch tape only. Identify recording mode by specifying density and parity only. Call NTIS Computer Products if you have questions. Price includes documentation, PB-296 392, and PB-296 393.

Williams, GH Gladstein, D
Federal Railroad Administration FRA/DF-791001, Dec. 1978, n.p.

ACKNOWLEDGMENT: NTIS
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PB-296391/6ST

02 198302
TESTS OF THE AMTRAK SDP-40F TRAIN CONSIST CONDUCTED ON CHESSIE SYSTEM TRACK, EXECUTIVE BRIEF
This report describes results of tests of an SDP-40F train consist conducted on Chessie System track during June, 1977. The test consisted of the operation of two test trains intended to be typical of AMTRAK passenger consists, one powered by two SDP-40F's and the other by two E-8's, over a variety of track conditions The objectives of the tests were to compare dynamic performance of the SDP-40F locomotive with a baseline case, the E-8, and to determine the sensitivity of the SDP-40F response to track geometry variations, operational parameters and several maintenance and configuration states of the truck/suspension system.

Transportation Systems Center, Federal Railroad Administration Final Rpt. FRA/ORD-79/18, May 1979, 24 p.

ACKNOWLEDGMENT: NTIS
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PB-297941/7ST, DOTL NTIS

02 198526
EXPERIMENTAL STUDY ON AERODYNAMICS OF TRAINS TRAVELING AT HIGH SPEEDS [Etudes experimentales sur l'aerodynamique des trains circulant a grande vitesse]
The aerodynamics of high speed trains, particularly for different traffic flow patterns at crossings, in tunnels, or in open were studied. Results show the steady and unsteady pressure forces on walls, the stresses on bodies in proximity to the train path, and pressure fluctuations in tunnels. Some of the results are verified by calculations involving a theoretical model. [French]

Conf-Presented at the 14TH Colloq. D'Aerodyn. Appl., Toulouse, 7-9 Nov. 1977.

Martin, P Coulmy, G Luu, TS
Paris University, Orsay AAAF-NT-78-21, ISBN-2-7170-0506-4, 1977, 39p

ACKNOWLEDGMENT: NTIS
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N79-23036/3ST

02 300584
DEVELOPMENT OF SIGNAL PROCESSING METHODS AS A MEANS OF MEASURING VERTICAL FORCES AT THE RAIL-WHEEL CONTACT POINT [Weiterentwicklung von Signalbehandlungsmethoden fuer die Messung der Vertikalkraefte im Beruehrungspunkt Rad/Schiene]
Expansible measuring strips are placed on the wheel so as to form an angle of 45 deg in relation to the wheel axis. These strips are interconnected by two Wheatstone bridges which emit continuous signals, thereby enabling the lateral force and ripple factor to be measured. [German]

Eriksson, S Nellgran, A *Glasers Annalen ZEV* Vol. 102 No. 5, May 1978, pp 143-146, 13 Phot.

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

DOTL JC

02 300676
TECHNIQUES FOR EVALUATING EFFECTS OF TRACK AND VEHICLE WEAR ON FREIGHT-CAR PERFORMANCE
Track and vehicle wear affect the dynamic performance and therefore the economic performance of the railcar-track system. A multiphase test program has been designed to determine the relationship between the dynamic performance of freight vehicles and track condition, vehicle-component wear, and variations in track structure. The first part of this program has been completed, i.e., the development of test, instrumentation, and analysis techniques and the determination of their applications to a baseline dynamic-performance test. The test methodology involves dynamic testing of a high-travel car and a reference or low-travel car. Two test tracks at the Transportation Test Center were used, the facility for accelerated services testing track and sections of the railroad test track. The instrumentation for each test vehicle included precision accelerometers to measure accelerations on the car body, bolsters, and trucks and instrumented wheel sets to measure lateral and vertical forces on the wheels. The analysis of the acceleration data is based on the use of six degrees of freedom, or rigid-body modes, for each primary mass (car body and truck). Statistical processing of the computed modal data is used to determine the effects of track structure and condition on vehicle performance. Transmissibility between truck and car body is calculated to determine the effect of component wear on vehicle performance. Finally, statistical processing of wheel-rail forces is used to obtain lateral-to-vertical force ratios and lateral wheel forces as functions of the track section. The instrumentation and data-processing techniques designed for this program proved effective in evaluating freight-car dynamics. Evaluation of the effects of variations in track structure on vehicle dynamics led to the following conclusions: (a) track containing unsupported bonded joints produced the highest car-body accelerations; (b) curves greater than 4 degrees and discrete events such as turnouts produced high accelerations and wheel forces; and (c) variations in track and roadbed such as ballast-shoulder width and depth, spiking patterns, tie material, and rail anchor type had little if any effect on the dynamic response of the vehicle.
This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Jones, CT (ENSCO, Incorporated); Gray, DE (Federal Railroad Administration) *Transportation Research Record* No. 694, 1978, pp 60-65, 7 Fig., 2 Ref.

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DOTL JC

02 300720
ECONOMICS OF FREIGHT CAR SIZE OR WHERE'S THE BOTTOM OF THE BATHTUB
Three presentations discuss the engineering economics of high-capacity freight cars, a subject of study by the AAR. The problem of determining optimal freight car size is complex; initial assumption that a family of curves could represent costs to the industry for moving freight in various size cars proved erroneous. It is concluded that there is no single maintenance-of-way versus axle-load curve; that track stiffness and curvature must be reflected in studies; that the unit-train versus the general traffic situation may differ; and that despite the capability for gathering and analyzing data much more study remains to be done.
Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Way, GH (Association of American Railroads) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 356-362, 5 Fig.

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02 300725
INTRODUCTION AND OVERVIEW OF FAST
The introduction, which describes the AAR role in administration of the Facility for Accelerated Service Testing, the functions of the AAR's Pueblo staff, and Fast report dissemination procedures, is followed by a series of individual reports on various tests. These reports are: Rail-Wheel Wear at FAST by W. J. Kucera; Some Results from the First FAST Metallurgy Experiments by R. K. Steele; Special Trackwork Tests at FAST by W. J. Cruse; Wood Tie and Fastener Performance by L. C. Collister; and Performance of Concrete Ties and Fastenings at FAST by J. W. Weber.
Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Lundgren, JR (Association of American Railroads) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 471-486, 13 Fig.

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02 300735
TRANSVERSE MOTION AND LATERAL FORCES OF A TWO-AXLE RAIL VEHICLE
The motion equations are derived for a two-axle rail vehicle on which oscillations are excited by the "rolling line" and "cross-level" functions. The elasticity of the track is also considered. To perform the calculation for stochastic excitations, two auto spectra and two cross spectra must be known. The test results have proved the theory to be correct. The running factor Wz and the lateral forces acting on the wheelset are calculated. The influence of the running speed, the effective tyre conicity and the gravitational stiffness are outlined. [German]

Mitschke, M *Glasers Annalen ZEV* Vol. 103 No. 2-3, Feb. 1979, pp 49-56

ACKNOWLEDGMENT: British Railways
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DOTL JC

02 301167
STABILITY OF LOCOMOTIVES AND CARS IN MOTION
High speed train running in optimum conditions of safety and comfort calls for computer studies into problems of rolling-stock and track stability. Theoretical studies are vital to the definition of adequate solutions. The article describes the theoretical methods used and compares results with those of tests carried out aboard a high-speed mobile laboratory.

Lazaryan, VA *Rail International* Vol. 10 No. 5, May 1979, pp 462-468, 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

02 301173
FLUTTER AND DIVERGENCE INSTABILITIES IN SYSTEMS OF RAILWAY WHEELSETS WITH SEMI-RIGID ARTICULATION
In the case where three wheelsets have semi-rigid articulation and either the distribution of conicity amongst the wheelsets or the position of the articulation joint are varied, it is shown that both flutter and divergence instabilities can occur at low speeds, in contrast to the more common dynamic instabilities of other forms of railway vehicles which are driven by the inertia forces.

Wickens, AH *Vehicle System Dynamics* Vol. 8 No. 1, Mar. 1979, pp 33-48, 4 Fig., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

02 301177
RESEARCH ON RAILWAY VEHICLE OSCILLATIONS [Untersuchung von Schienenfahrzeugschwingungen]
After recalling the importance of the matter, the authors put forward methods for measuring and analysing dynamic stresses in locomotives and a mathematical model of the vehicle-track assembly. The article supplies some results from tests carried out on tractive units of the ET-22 electric locomotive type. [German]

Bajon, W *DET Eisenbahntechnik* Vol. 27 No. 5, May 1979, pp 198-200, 2 Fig., 2 Tab., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

02 301180
THE ELECTRONIC DEVICE FOR MEASURING THE COEFFICIENT OF TRAIN RUNNING STABILITY W
[Elektroniczny miernik wspolczynnika spokojnosci biegu pociagu W]
Description of the design and operation of a portable electronic device for measuring the running stability coefficient WZ of a train produced by the Railway Research Institute (COBiRTK). The results are shown directly on a luminous display panel. [Polish]

Drzewiecki, J *Pojazdy Szynowe* No. 3, 1978, pp 7-10, 1 Tab., 9 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Pojazdy Szynowe, Poznan, Poland

02 301181
ON THE NATURE OF PROCESSES DETERMINED BY LACK OF WHEEL ADHESION ON THE RAILS IN INDIVIDUAL LOCOMOTIVE PROPULSION SYSTEMS WITH ELECTRIC MOTORS [O charakterze dynamicznych procesow ustalonych przy naruszaniu przyczepnosci kol do toru w indywidualnych ukladach napedowych lokomotyw z silnikami elektrycznymi]
Analysis of the dynamic processes in the case of inadequate wheel-rail adhesion during starting and electrodynamic braking of locomotives in heavy trains. Mathematical model used for the analysis. [Polish]

Madej, J *Pojazdy Szynowe* No. 3, 1978, pp 36-39, 2 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Pojazdy Szynowe, Poznan, Poland

02 301188
ON THE PRACTICAL ASPECTS OF THE FIRST DEGREE COEFFICIENT OF DYNAMIC INSUFFICIENCY OF ADHESION [O praktycznym aspekcie wyroznika I rzedu dynamicznego naruszania przyczepnosci]
No Abstract. [Polish]

Madej, J *Pojazdy Szynowe* No. 3, 1978, pp 39-44, 9 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Pojazdy Szynowe, Poznan, Poland

02 301194
WHEEL/RAIL BEHAVIOR AT HIGH SPEEDS [Verhalten von rad und Schiene bei Hohen Geschwindigkeiten]
The paper gives a survey of the objectives, methods and results of mathematical and experimental investigations in the field of vehicle/track dynamics. The running performance in horizontal/transverse direction and the vibration behavior in vertical direction are treated separately and assessed under due consideration of the operator's demands for safety, comfort and economy. [German]

Nefzger, A (Bundesbahn-Zentralamt, West Germany) *Glasers Annalen ZEV* Vol. 103 No. 2-3, Feb. 1979, pp 57-68, 27 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

02 301197
STATISTICS OF MECHANICAL SHOCK
The nature and origins of train transportation mechanical shock are reviewed. The statistics of military goods rail journeys are described and journey parameters such as average journey length and average number of shocks/journey are specified. In conjunction with already published data on rail shock severities, the expected maximum shock for various journey lengths is derived.

Johnson, GE *Society of Environmental Engineers, Journal* Vol. 18 No. 1, Mar. 1979, pp 21-24, 5 Ref.

ACKNOWLEDGMENT: EI
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02 301200
ANALOG SIMULATION STUDY OF THE ROCKING RESPONSE OF A RAILROAD FREIGHT VEHICLE
The steady state response of a single large capacity railroad freight vehicle is presented. The vehicle is described through an appropriate multi-degree of freedom non-linear mathematical model. The equations of motion of the system are derived by using Lagrange's procedure. The analog computer is employed for solving the non-linear differential equations of motion for obtaining the system's rocking response in the time domain. The vehicle steady state frequency response is derived from a sequence of time responses. By utilizing the frequency response plots, a complete study of the system sensitivity to variation in the suspension parameters is carried out. The study shows that a possible practical solution to the freight car rocking problem can be achieved by using additional stabilizing devices consisting of friction and viscous dampers.

Samaha, M (Concordia University, Canada) *Journal of Sound and Vibration* Vol. 63 No. 1, Mar. 1979, pp 109-124, 10 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

02 301205
INVESTIGATION OF RAIL VEHICLE OSCILLATIONS
In regard of the importance of rail vehicle oscillation, methods for measuring and analysing of tractive stock dynamics are described. A mathematical model of the whole vehicle-track-system is investigated. The oscillations of this complex system which occur in service, are dealt with as a stochastic process. Some results of measurements and oscillation analysis with six types of tractive units are presented by example of the excited vehicle body of the electric locomotive, type ET-22. [German]

Bajon, W *DET Eisenbahntechnik* Vol. 27 No. 5, May 1979, pp 198-200

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

02 301207
ANALYSIS OF TRAIN DRAG IN VARIOUS CONFIGURATIONS OF LONG TUNNEL
Designers of long rail tunnels in many parts of the world are presently hampered by the scarcity of information allowing a prediction of train drag. Such data are vital to the optimum choice of tunnel configuration, and particularly the cross-sectional dimensions, because of its bearing on train power requirement, traction energy costs and the temperature conditions of the tunnel environment. The paper describes a relatively unsophisticated theory which predicts overall mean values of aerodynamic drag for various combinations of train and tunnel types. Where possible, comparisons are made with other experimental and theoretical data. An important part of the paper then discusses the trends arising from the results, and in particular the implications that these have on the decision-making process for a particular railway tunnel requirement.

Paper presented to the 3rd International Symposium on the Aerodynamics and Ventilation of Vehicle Tunnels Sheffield, March, 1979.

Gawthorpe, RG Pope, CW Green, RH
British Hydromechanics Research Association Conf Paper Paper G.1, 1979, 23 p.

ACKNOWLEDGMENT: British Railways
ORDER FROM: British Hydromechanics Research Association, Cranfield MK43 0AJ, Bedfordshire, England

02 301209
ON THE RANGE OF VALIDITY OF SIMPLIFIED ONE DIMENSIONAL THEORIES FOR CALCULATING UNSTEADY FLOWS IN RAILWAY TUNNELS
Methods of calculating unsteady flows in tunnels have been developed in Japan in connection with the Shinkansen high speed train. In this country the High Speed Train, the Advanced Passenger Train and the Channel Tunnel project have provided the incentive for work on methods of calculation. Another approach has been developed in France, aimed primarily at underground metro systems.

Paper presented to the 3rd International Symposium on the Aerodynamics and Ventilation of Vehicle Tunnels, Sheffield, March, 1979.

Woods, WA Pope, CW
British Hydromechanics Research Association Conf Paper Paper D.2, 1979, 36 p.

ACKNOWLEDGMENT: British Railways
ORDER FROM: British Hydromechanics Research Association, Cranfield MK43 0AJ, Bedfordshire, England

02 301428
DISSIPATION OF ENERGY IN THE SPRING SUSPENSION OF TRUCKS AND EFFECT ON THE RESISTANCE TO FORWARD MOTION OF FREIGHT CARS [Vlijanie rasseivanija energii v ressornom podvesivanii telezek na soprotivlenie dirzeniju gruzovyh]
No Abstract. [Russian]

Graceva, LO Hudjakova, AA *Vestnik VNIIZT* No. 3, 1979, pp 37-39, 2 Fig., 4 Ref.

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

02 301444
DYNAMIC BEHAVIOR OF BRIDGE GIRDER FOR HIGH SPEED RAILWAY BRIDGE
The equations of motion for the dynamic interaction between high speed train and bridge are derived. They are solved using the practical data on real cars and bridges of Shinkansen, and referring to the results of model testing and field measurement, the characteristics of the dynamic response of girder to high speed train are analyzed. It is concluded that the effect of periodic axle arrangement of long train is prominent in the dynamic response of railway bridge for high speed train. And a lower limit of the bending rigidity of girder in terms of the natural frequency is proposed.

Matsuura, A *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 70-76, 15 Fig., 2 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

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02 301711
THE WHEEL-RAIL RESEARCH PROGRAMME AND THE WHEEL-RAIL RESEARCH COMMUNITY CONCERNED [Das Rad/Schiene-Forschungsprogramm und die Forschungsgemeinschaft Rad/Schiene]
The main points in the research programme are described, the organisation structure shown, and also the tasks facing the wheel/rail research community. [German]

Hochbruck, H *Eisenbahntechnische Rundschau* Vol. 28 No. 4, 1979, pp 235-242, 9 Phot., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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02 301717
AERODYNAMICS SEMINAR "LONG-DISTANCE GUIDED TRANSPORT, WHEEL/RAIL TECHNIQUE." REPORTS [Aerodynamisches Seminar "Spurgefuehrter Fernverkehr, Rad/Schiene-Technik". Berichte]
An aerodynamics seminar was held in June 1979 in Goettingen, within the framework of the general research activities of the wheel/rail program, to discuss the state of progress before a gathering of experts. [German]

Deutsche Eisenbahn Consulting GmbH DB:Dok 4972, 1979, 400 p., Tabs., Phots., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Deutsche Eisenbahn Consulting GmbH, Oskarsommerstrasse #15, 6000 Frankfurt 70, West Germany

02 301723
MEASUREMENT OF HORIZONTAL FORCES EXERTED ON THE RAIL [Ueber das Messen der Horizontalkraefte an der Schiene]
This article analyzes the accuracy of techniques used to measure the horizontal forces exerted on rails and fills in the void which existed previously. Use of the measuring technique proposed, known as the "double bridge", prevents the vertical force exerted simultaneously from affecting measurement of the horizontal force. [German]

Danilenko, EI *DET Eisenbahntechnik* Vol. 27 No. 6, 1979, pp 228-230, 2 Tab., 6 Phot., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

02 301727
RUNNING STABILITY AND RIDING QUALITY OF RAILWAY VEHICLES [Ustojcivost' dvizenija i hodovye kacestva rel'sovago ekipaza]
No Abstract. [Russian]

Lazarjan, VA *Vestnik VNIIZT* No. 3, 1979, pp 22-25, 4 Fig., 6 Ref.

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

02 301808
TECHNICAL FEASIBILITY OF RIDE QUALITY MONITORING SYSTEM FOR RAIL PASSENGER SERVICES
Ride quality assessment from both the aspect of passenger comfort and of maintainability of vehicle and track is examined. Regular ride recording is carried out on high speed trains in Britain and Japan. In Britain the results are used to indicate track alignment problems and in Japan as a tool in determining vehicle maintenance requirements. Both situations are examined, together with a description of pen recording of acceleration. Methods used in assessing human comfort and deterioration of vehicles and track are described. A graphical representation is presented and suggestions made for separating track and vehicle dynamic effects.

Blader, FB
Blader Engineering Limited, Transport Canada Research and Development Centre Final Rpt. TP 1965, Dec. 1978, 25 p., 2 Fig., 5 Ref., 2 App.

ORDER FROM: Blader Engineering Limited, 2060 Rideau River Drive, Ottawa, Ontario KIS 1V3, Canada

02 302324
THE SCALES-DEVINE RADIALBOGIE: A SOLUTION TO WHEEL/RAIL INTERACTION
Successful tests with this truck beneath a CP Rail coal car have overcome problems of poor curving. Such a truck is also proposed for transit cars and locomotives which will improve adhesion and reduce rolling resistance in curves.

Scales, BT *Rail Engineering International* Vol. 8 No. 2, Apr. 1979, pp 43-44, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

02 302333
NEW TRAIN-RUNNING TEST BENCH WITH FRICTION WHEEL DRIVE AT THE BERLIN TECHNICAL UNIVERSITY VEHICLE TECHNIQUE INSTITUTE [Neuer Zugfahrt-Messstand mit Reibradgetriebe am Institut fuer Fahrzeugtechnik der Technischen Universitaet Berlin]
On the basis of a machine built in 1962 for testing adhesion during running at the Aachen Technical High School, a new testing installation has been developed to carry out dynamic and tribological tests in wheel/rail research. The installation can also be used to study physical and chemical phenomena in the layers just below the surface where there is wheel/rail contact in conditions that are very close to reality for the required length of time. Accurate measurement results can be reproduced. [German]

Bugarcic, H Benz, D *Glasers Annalen ZEV* Vol. 103 No. 6, June 1979, pp 259-267, 17 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

02 302712
AERODYNAMICS AND SAFETY OF RAILWAY TUNNELS
New contributions to the advanced state of theoretical models of tunnel airflows are described and the implications of a recent tunnel fire are discussed. Data are presented that show the influence of tunnel geometry on train entry pressure transients and on static pressures alongside the front of a train.

Vardy, AE (Dundee University, England) *Railway Engineer International* Vol. 4 No. 3, May 1979, p 67, 6 Ref.

ACKNOWLEDGMENT: EI
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02 302723
WORK OF PROFESSOR HEUMANN IN THE FIELD OF GUIDED TRANSPORT, IN THE CONTEXT OF CURRENT WHEEL/RAIL TECHNIQUES [Prof. Heumanns Arbeiten auf dem Gebiet der Spurfuehrung im Zeichen der heutigen Rad/Schiene-Technik]
The Heumann process for determining guidance forces and their conditions is described and compared with the current state of progress in wheel/rail techniques. The figures evaluated were confirmed by the experimental figures obtained by the CFF during journeys made with Ae 6/6 and Re 4/4 type locomotives, with curve radii of 300 m. By using Heumann's minimum process and methods evolved for analytical evaluation, it is possible to calculate in advance with sufficient accuracy the stress on the track when a locomotive is being run. [German]

Weber, HH *Leichtbau der Verkehrsfahrzeuge* Vol. 23 No. 3, May 1979, pp 67-76, 26 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germa, ny

02 303174
AUSTRALIAN RESEARCH AIMED AT JUMBO ORE TRAIN SAFETY
When heavy-haul railways were first developing, stress and wear were countered by making all the components bigger, such as bigger wheels, bearings and rails. But as the weight of the jumbo trains and their loads move steadily upwards, the concept is running into technical problems. Both the permanent way and the rolling stock have shown a tendency to destroy themselves. The iron ore export companies have started a long-term research program to solve the problems.

Canadian Mining Journal Vol. 100 No. 5, May 1979, pp 115-116

ACKNOWLEDGMENT: EI
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02 303599
THE INFLUENCE OF TRUCK HUNTING SEVERITY ON FREIGHT CAR STRUCTURES
In recent years much effort has been expended within the industry on investigating the causes of truck lateral instability or hunting. To determine the cause of this phenomenon various research organizations, among them the Association of American Railroads and Arizona State University have performed comprehensive tests to validate mathematical models which can be used to conduct parametric studies. These models allow for investigating various means for alleviating the non-linear instability problem. In addition, much effort has been expended by a number of private companies to develop freight car trucks with superior hunting performance. It is now well understood by the railroad industry that, given the current state-of-the-art in freight car truck design, some truck hunting behavior is unavoidable. Less attention, however, has been directed toward determination of what amount of truck hunting, if any, is acceptable. This paper describes the results of two field investigations in which truck hunting instability led to either excessive wear or structural degradation. Various means readily available to the industry were then investigated as to their effectiveness in controlling hunting. Results are presented showing that the particular problems encountered were avoided by control of the hunting phenomenon rather than its complete elimination.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Hengel, MF (Missouri Pacific Railroad Company); Montgomery, C (Atchison, Topeka and Santa Fe Railway); Billingsley, RH (ACF Industries, Incorporated)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-1, Aug. 1979, 5 p., 7 Fig., 2 Ref.

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02 303602
RIDE QUALITY ANALYSIS OF MULTI-LEVEL AUTO RACK EQUIPPED FLAT CARS
Ride characteristics of three different truck spring arrangements applied to multi-level auto rack equipped 89 ft. (27.1 m) flat cars were measured. Spring arrangements consisted of a group designed to carry the full AAR axle capacity, a reduced capacity group designed for the actual weight carried, and a hydraulically damped spring group. Data was reduced using a spectrum analyzer to produce spectral density plots.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Carman, RW Kieres, KC (Southern Railway Company)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-4, Aug. 1979, 5 p., 10 Fig., 1 Tab.

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02 303604
A METHODOLOGY FOR ESTIMATING THE DERAILMENT PROBABILITY OF A FLEET OF RAILWAY VEHICLES
Procedures for stochastic dynamic analysis are developed by which the probability of dynamically induced derailment of a fleet of rail vehicles can be estimated as a function of track quality and train operating conditions. Despite the wide variety of underlying causes, virtually any derailment can be classified as occurring in one of only a few fundamental modes; for each mode, candidate performance indices are defined to relate derailment potential to the dynamic state. A procedure is established to select and quantify those indices which are most highly correlated with the identified derailment modes. In order to treat large numbers of different vehicles, generic car families are defined on the basis of dynamic similarity. Each family is then characterized by statistical distributions of the physical parameters associated with its member.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Brantman, R (Transportation Systems Center); Griffin, JW (Dynamics Research Corporation); Jeffcoat, RL (Analytic Sciences Corporation)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-6, Aug. 1979, 8 p., 11 Fig., 5 Tab., 9 Ref.

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02 303607
COUPLER OVERRIDE MECHANISMS
During the past ten years, many serious railroad accidents have been attributed to coupler override. From 1974 to 1976, the Federal Railroad Administration conducted controlled impacts to help determine the causes and possible prevention of coupler override. A detailed investigation of accidents, of the controlled impacts, and of theoretical train-action models has led to the positive identification of several override mechanisms. A firm understanding of these mechanisms is of great benefit in the reconstruction of accidents as well as in the design of preventative measures and devices.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Diboll, WB Peters, DA (Washington University, St Louis)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-9, Aug. 1979, 7 p., 12 Fig., 16 Ref.

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02 303608
ANALYSIS AND MEASUREMENT OF LOCOMOTIVE DYNAMIC CHARACTERISTICS
In June of 1977, comparative tests of the E-8 and SDP-40F locomotives were conducted on Chessie System track with the goal of comparing dynamic

performance of these locomotives and identifying key track, vehicle, and operational parameters affecting safety. Based on the test results, it was possible to establish that significant differences existed in the response of these two locomotives when operating in curves above the balance speed. The test data also enabled quantification of the influence of variations in truck vertical damping, lateral axle clearance, and wheel diameter mismatch. Interaction of the SDP-40F locomotive with its trailing baggage car was also investigated; and there were indications of the existence of strong lateral and vertical dynamic coupling. Finally, identification of the key track and operational parameters contributing to high lateral axle loads was accomplished through a multiple regression analysis of the survey run data.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Tong, P Brantman, R (Transportation Systems Center); Grief, R (Tufts University)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-10, Aug. 1979, 11 p., 18 Fig., 5 Ref., 1 App.

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02 303610
CRITERIA FOR HIGH-SPEED CURVING OF RAIL VEHICLES
This paper proposes a set of criteria for the speed limits of rail vehicles in curves. The criteria were compiled as a possible approach to permitting higher speeds in curves for vehicles designed for that purpose while not compromising safety or ride comfort. The recommended performance criteria provide a complete range of conservative limits for the safety and comfort issues which relate directly to curving. No element of the criteria represents an extreme value among those used by responsible authorities in current practice. The work was performed as part of the Improved Passenger Equipment Evaluation Program, sponsored by the Federal Railroad Administration as a means of providing long-range planning for future improvements in passenger vehicles for the U.S. fleet.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Dean, FE Ahlbeck, DR (Battelle Columbus Laboratories)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-12, Aug. 1979, 7 p., 2 Fig., 18 Ref.

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02 303613
TRUCK DESIGN OPTIMIZATION PROJECT--ASSESSMENT OF TRUCK DESIGN CHARACTERISTICS
As part of the activities of the Federal Railroad Administration sponsored Phase II of the Truck Design Optimization Project (TDOP) in developing economic-based performance and testing specifications, a sufficient number of commercially available special purpose trucks (type II trucks) were selected for testing. The primary purpose of this paper is to present the procedure used and the results of the selection of type II trucks. In addition, the methodology for truck design evaluation and other on-going tasks of TDOP is also briefly discussed in view of their relationship to the development of performance and testing specifications for freight car trucks.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Tsai, NT (Federal Railroad Administration); Rama Chandran, PV Cappel, KL (Wyle Laboratories)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-15, Aug. 1979, 8 p., 11 Fig., 6 Ref.

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02 303617
VALIDATION AND VERIFICATION OF RAIL-VEHICLE MODELS
A conceptual approach to model validation and verification is developed for application to rail-vehicle systems. In this paper, validation and verification are distinguished, respectively, by association with the qualitative (structure definition) and quantitative (parameter estimation) aspects of the modeling problem. Verifiability is quantitatively described in terms of: (1) the correspondence between the measurable behaviour of a physical system and the model parameters being evaluated, (2) the quantity of measured data available, and (3) the quality of those data. The three factors are directly related to corresponding mathematical terms in a general numerical algorithm for Bayesian statistical parameter estimation. The framework of analysis developed around this concept provides insight to validation test planning, and the establishment of realistic standards or criteria of acceptability for a mathematical model. Examples based on recent experience involving the analysis of a 100-ton hopper car are included in the paper.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Hasselman, TK (Wiggins (JH) Company); Johnson, L (Wyle Laboratories)
American Society of Mechanical Engineers Conf Paper 79-WA/DSC-8, July 1979, 10 p., 8 Fig., 4 Tab., 17 Ref., 1 App.

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02 303629
A STUDY ON THE DISPLACEMENT OF GOODS LOADED INSIDE CARS [Issledovanie uskorenij i peremescenij gruzov v vagonah]
Based on studies carried out by VNIIZT, the writer measures the displacement of the goods loaded in cars in relation to various buffing speeds and the degree of rigidity of the fastenings. The load-car interaction is described by a system of non-linear differential equations, using the method of D'Alembert and Lagrange equations. [Russian]

Malov, AD *Vestnik VNIIZT* No. 4, 1979, pp 50-55, 5 Fig., 2 Tab., 5 Ref.

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

02 303640
CONSIDERATIONS ON THE THEORY OF MOVEMENT OF A RAILWAY VEHICLE WHEELSET ON THE TRACK. DERIVATION OF BASIC EQUATIONS EXPRESSING THE HORIZONTAL MOVEMENT OF WHEELSETS [Betrachtungen zur Theorie der Bewegung des Eisenbahnradsatzes im Gleis. Ableitung von Grundgleichungen zum Beschreiben von horizontalen Radsatzbewegungen]
The characteristics of wheelsets affect running stability and axle wear to a considerable extent. The article discusses the relations between axle configuration and track geometry, and provides simple differential equations expressing in mathematical terms the movement of a wheelset on straight and curved track. [German]

Wiessner, M *DET Eisenbahntechnik* Vol. 27 No. 8, Aug. 1979, pp 317-321, 1 Tab., 10 Phot., 23 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

02 303641
VIEWS ON THE SELECTION OF AN EFFECTIVE TORSION STRENGTH IN CAR BODIES [Gesichtspunkte fuer die Wahl einer zweckmaessigen Verwindungsharte von Gueterwagenkaesten]
Torsional resistance in car bodies around the longitudinal center-line must be as low as possible to prevent derailment but from the technical point of view of car stability must be high. Taking as an example three cars of the E, Hbis and Gs types, the effect of torsional resistance on the rolling movement and hence on car stability is shown. The actual frequency of the roll should exceed the sinusoidal frequency of the wheelset action, i.e. should exceed 3.2 Hz for a speed of 100 km/h. [German]

Sperling, E *Leichtbau der Verkehrsfahrzeuge* Vol. 23 No. 4, July 1979, pp 102-105, 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

02 303676
BOGIE CURVING TRIALS, RAIL PROFILING AND THEORETICAL MODELLING TO REDUCE RAIL DETERIORATION AND WHEEL WEAR ON CURVES
A novel technique of rail profiling is presented which has been used in curved track and has been found to greatly reduce the rate of wear on the high or

outer rail. Wheel wear is similarly reduced. Instrumented ore car trials also aimed at reducing wheel and rail wear by improved bogie tracking are described. Rail geometry and bogie characteristics are linked by a digital computer model designed to study the numerous interacting variables and predict optimum values for each.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Townend, PH (Mt. Newman Mining Company Pty Ltd, Australia); Epp, CJ Clark, PJ (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 203 Pap G.1, 1978, pp 1-7, 20 Fig., 2 Tab., 9 Ref.

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

DOTL RP

02 303677

THE EFFECT OF WHEEL AND RAIL IRREGULARITIES ON THE TRACK

This paper reviews the effect of track irregularities and wheelflats in causing dynamic increments in wheel/rail force. The role of vehicle unsprung mass and track characteristics in governing the size of dynamic increments is examined. It is shown that an increase in axle load will result in more rapid initial deterioration at joints and other soft spots and that for freight vehicles running over irregularities due to joints and welds, the dynamic forces should depend on the parameter sq MV. The causes of irregularities in welded track are discussed and the importance of producing straight long welded rail is emphasised. Recent experimental and theoretical work on wheelflat impacts is described and the consequences of a wheelflat coinciding with P2 type forces due to joint or weld irregularities are considered. The importance of developing quantitative track damage models to assess the increased permanent way costs associated with heavier axle loads is emphasised.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Frederick, CO (British Rail)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 204 Pap G.2, 1978, pp 1-14, 17 Fig., 15 Ref., 3 App.

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

DOTL RP

02 303680

WHEEL-RAIL CONTACT AND FORCES IN CURVES

The forces acting on a six-wheel bogie in a curve are compared with those on a four-wheel bogie using the Heumann graphical method of determining forces. It is shown that unless the center or end axles have adequate lateral float, replacing four-wheel bogies by six-wheel, although reducing nominal wheel-load by about 30%, may not reduce the wheel-rail contact forces on the leading wheelsets. The relationship between wheel and rail profiles is discussed, emphasising the need for close control of track gauge and care in matching wheel and rail profiles, particularly on railways where intensive traffic is to be introduced on rail of fairly light section.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Fairweather, DMS (Rendel Palmer and Tritton, England)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 207 Pap G.3, 1978, pp 1-8, 9 Fig., 5 Ref., 1 App.

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

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02 303681

WHEEL--RAIL DYNAMICS

While studies of rail vehicle dynamics have usually been aimed at improving passenger comfort, reducing freight damage, preventing unstable behavior and maintaining track forces within established limits, this paper reviews some factors more appropriate to heavy-haul railways operating at low speed, presenting data on predicted vertical loads applied to the track at discrete and cyclic disturbances.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Butcher, CFG Horn, GV (Commonwealth Engineering (NSW) Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 208 Pap G.4, 1978, pp 1-9, 6 Tab., 24 Ref.

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

DOTL RP

02 303689

A COMPUTER AIDED STUDY OF THE LONGITUDINAL DYNAMICS OF LONG ORE TRAINS

Longitudinal motion in long ore trains has induced enough fatigue damage in draw gear components to cause serious maintenance problems. A project is described in which a set of computer packages has been developed to investigate this motion and to evaluate strategies designed to reduce its intensity. The computer packages are based on a detailed description of train behaviour obtained from a series of track tests with instrumented trains. An outline of the instrumentation is included.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Booth, PF (Mt. Newman Mining Company Pty Ltd, Australia); Blair, JR Steven, DH (Western Australia University, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 301 Pap D.4, 1978, pp 1-9, 6 Fig., 7 Ref.

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

DOTL RP

02 303690

APPLICATION OF COMPUTER SIMULATION TO RAILROADS

Information on train performance is required to evaluate railroad design and to determine operating schedules. Computer simulation provides an accurate and convenient means of obtaining this data. In long heavy trains longitudinal dynamics is a significant operational factor causing high forces and consequent failures. Locomotive dynamics, arising from the complex power and control systems, influence the train dynamics, and have a direct bearing on locomotive performance. These complicated problems have been investigated with the aid of computer simulation models, providing insight and results which would be most difficult to obtain by other methods.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Fitzgerald, BW Kerr, AJ Thompson, IR (Western Australia University, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 302 Pap D.2, 1978, pp 1-9, 8 Fig., 1 Tab., 19 Ref.

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

DOTL RP

02 303696

THEORETICAL AND EXPERIMENTAL RESEARCH ON FREIGHT CAR LATERAL DYNAMICS

A five year study of rail freight car dynamics is summarized. The paper emphasizes the effort to validate theoretical analyses of rail vehicle dynamics

with results from field testing. The theoretical analyses, solution techniques, field testing, data processing and validation results are given.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Cooperrider, NK (Arizona State University, Tempe); Law, EH (Clemson University); Fries, RH (Arizona State University, Tempe); Tsai, NT (Federal Railroad Administration)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 310 Pap E.5, 1978, pp 1-16, 17 Fig., 4 Tab., 22 Ref.

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

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02 303700
DYNAMIC CURVE NEGOTIATION BEHAVIOR OF A FREIGHT CAR

A parametric study is made for curve negotiation forces on a wheel flange of a freight car. Effects of various truck-design and track parameters on lateral wheel flange load resulting from wheel rail interaction are investigated. It is found that superelevation, degree of curvature, length of transition curve and speed have appreciable effects on lateral wheel flange loads and wear of rail and wheel on a curved track. A large wheel conicity is not advantageous on curves that are greater than 2 deg provided track irregularities are present. A lateral wheel flange load can be reduced by superelevating the track.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Garg, VK Singh, SP (Association of American Railroads Technical Center)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 314 Pap E.3, 1978, pp 1-6, 7 Fig., 6 Ref., 1 App.

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

DOTL RP

02 303701
DERAILMENTS ON A HEAVY HAUL RAILWAY

Hamersley Iron has undertaken an active research program into causes of all major derailments on its railway. The basis of the program has been developed from the history of derailments during the relatively short interval that the railway has operated. This paper outlines the definitive causes of derailments during the past 12 years and demonstrates how these facts have been used in an attempt to reduce the frequency and magnitude of derailments in the future.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Fahey, WR Williams, EH Haby, I Adamson, WJ (Hamersley Iron Pty Limited, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 315 Pap E.4, 1978, pp 1-6, 1 Tab.

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

DOTL RP

02 303707
LOCOMOTIVE WHEEL-RAIL LOADING--A SYSTEMS APPROACH

Factors in locomotive wheel-rail loading are reviewed as they relate to the locomotive system, the track system, and train operation. The lateral and vertical loads between wheel and rail are separated into steady state and dynamic components and are documented with experimental data from full-scale locomotive tests and analytical data obtained from computer models. Locomotive and track design are discussed with regard to basic curve negotiation loads. The relationship between creep and friction at the wheel-rail interface is reviewed, and the effects of driving and braking on lateral wheel-rail loads are predicted. Recommendations are given for controlling the level of loads generated by train operation. The influences of track geometry deviations on dynamic loads are discussed. Experimental data is reported for the level and time duration of lateral load/vertical load (L/V) ratios.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Koci, HH Swenson, CA (General Motors Corporation)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 405 Pap F.3, 1978, pp 1-16, 26 Fig., Refs.

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

DOTL RP

02 303722
HEAVY RAIL LOADING BY LOCOMOTIVES AND CARS

This paper presents a historical sketch of the increase of rail size and axle loadings over the past 150 years, along with ultimate problems. Also described are high capacity cars and the world's largest locomotives which have been operated by the Union Pacific Railroad.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Accord, FD (Union Pacific Railroad Company)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 504 Pap A.8, 1978, pp 1-4, 1 Tab.

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

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02 303723
LONGITUDINAL DYNAMICS OF A LONG TRAIN DURING THE DUMPING OPERATION

A computer model has been developed which simulates the behavior of long unit trains as they are indexed through car dumpers. The model can be used to increase the life of ore car couplers and draft gears as well as the car moving equipment.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Williams, CG (Mt. Newman Mining Company Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Paper X.1, 1978, pp 1-8, 6 Fig., 3 Ref.

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

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02 304128
DYNAMIC ANALYSIS TO ESTABLISH NORMAL SHOCK AND VIBRATION OF RADIOACTIVE MATERIAL SHIPPING PACKAGES

The objective of this study is to determine the extent to which the shocks and vibrations experienced by radioactive material shipping packages during normal transport conditions are influenced by, or are sensitive to, various structural parameters of the transport system (i.e., package, package supports, and vehicle). The purpose of this effort is to identify those parameters which significantly affect the normal shock and vibration environments so as to provide the basis for determining the forces transmitted to radioactive material packages. Determination of these forces will provide the input data necessary for a broad range of package-tiedown structural assessments.

Fields, SR Mech, SJ
Hanford Engineering Development Laboratory, Nuclear Regulatory Commission, Department of Energy Prog Rpt. HEDL-TME-79-3, June 1979, 61 p.

Contract DOE-EY-76-C-14-2170

ACKNOWLEDGMENT: NTIS
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NUREG/CR-0766

02 304658
TEST TRAIN PROGRAM. TENTH ANNUAL REPORT
This report describes the progress on the Engineering and Test Support Services for Railroad Instrumentation, Data Acquisition, Processing and Evaluation Program from 1 July 1977 through 30 June 1978. The report covers operation of the FRA track-geometry-measurement, data acquisition and rail-flaw-detection fleet, as well as track survey operations and the related data processing. The report also describes special tests on Lightweight Flatcar Evaluation, Full-Scale Aerodynamic Tests of Trailer-on-a-Flatcar, Piggyback Evaluation, Maintenance-of-Way, Passenger Vehicle Studies, Dynamic Locomotive Testing, and Track Stiffness Measurement System Evaluation. Fabrication and installation of the new Wayside Detection Facility at TTC is also described herein.
See also 9th Progress report, PB-289690.

ENSCO, Incorporated, Federal Railroad Administration FRA/ORD-78/75, Apr. 1979, 99 p.

Contract DOT-FR-79-64113

ACKNOWLEDGMENT: NTIS
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PB-300760/6ST, DOTL NTIS

02 304679
TRUCK DESIGN OPTIMIZATION PROJECT. PHASE II. PHASE I. DATA EVALUATION AND ANALYSIS REPORT [Technical rept. Dec 77-Apr 79]
As part of the TDOP Phase II project, the FRA directed Wyle Laboratories to evaluate and analyze the test data acquired during TDOP Phase I for use in Phase II model validation and specification of performance indices. These data were contained on 204 magnetic tapes and computer printouts. The applicability of the Phase I test data to Phase II was evaluated from three points of view. The first was completeness of the test matrix. Most Phase I tests were conducted using the 70 ton refrigerator car on an ASF ride control truck with new wheel profiles. Although this over-emphasis on one configuration will necessitate additional testing of the Type I truck, it was possible to derive useful information from the Phase I test data. The second was measurement accuracy. The quality of measurements was acceptable except for measurements of lateral wheel force at the wheel/rail interface and in the detection of ALD targets. The third point of view was the Phase I data's adequacy to perform the Type I truck model validation and specification of performance indices. The data in the regimes of ride quality and lateral stability appear to be adequate. In the regimes of curve negotiation and trackability, the lack of adequate measurements of wheel/rail forces makes it difficult to extract meaningful information from the data.
See also PB-288739.

Gibson, DW Glaser, RJ
Wyle Laboratories, Federal Railroad Administration Tech Rpt. FRA/ORD-78/52, TDOP/TR-02, Aug. 1979, 81 p.

Contract DOT-FR-742-4277

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300969/3ST, DOTL NTIS

02 304709
TRANSPORTATION OF VIBRATION SENSITIVE EQUIPMENT BY HIGHWAY TRAILER ON AN INTERMODAL RAILCAR-VOLUME I
The report includes the results of a cooperative research project between Government and industry to explore the potential for the use of highway trailers on intermodal railcars (Trailer on Flatcar) or (TOFC) to transport vibration sensitive lading. The purpose of the project was to characterize the operating environment of TOFC during the transport of vibration-sensitive teletypewriters. To this end, the lading, two types of trailers and the conventional TOFC flatcar were instrumented to quantify the shock and vibration environment during typical over-the-road revenue operation. The trailers used were a conventional railroad-owned leaf-spring trailer and an air-ride moving van. Various measurements of the accelerations experienced by the lading as well as the TOFC components were taken during the road test. Test equipment, test procedures and data processing techniques used are discussed in the report. The results of the test indicated that the ride quality of both types of trailers are similar and that TOFC is feasible for the transportation of vibration-sensitive equipment. Test results contained in the report provide useful information to traffic managers and packaging engineers.

Kenworthy, M
ENSCO, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-79/05.I, July 1979, 125 p.

Contract DOT-FR-64113

ACKNOWLEDGMENT: NTIS
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PB-301219/2ST, DOTL NTIS

02 307673
TRACKSIDE WATER SPRAYS TO CLEAR RAILHEAD LEAF DEBRIS
As the leaves begin to fall in the U.K., Southern Region is investigating new trackside spray equipment for keeping the railhead clear of leaf debris which can cause poor adhesion.

Taylor, RK Watkins, DJ *Railway Engineer International* Vol. 4 No. 5, Sept. 1979, pp 84-86, 3 Fig., 3 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

02 307679
DETERMINATION AND EVALUATION OF CHARACTERISTIC VALUES OF DYNAMIC FORCES IN RAILWAY VEHICLES [Signalkenngrossen dynamischer Beanspruchungen an Schienenfahrzeugen]
Examination and comparison of various mathematical methods of evaluating and calculating dynamic forces exerted in railway vehicles. [German]

Schulz, E Gassauer, H *DET Eisenbahntechnik* Vol. 27 No. 9, Sept. 1979, pp 352-356, 7 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

02 307686
TRANSVERSE DYNAMICS OF 2-AXLE RAIL VEHICLES [Querdynamik zweiachsiger Schienenfahrzeuge]
The transverse dynamics of vehicles comprise the study of stress oscillations caused by track irregularities and the stability control of natural oscillations. Using a calculation model established for a 2-axle railway vehicle, a procedure is described for dealing with these two types of problem. The effect of vehicle parameters on running behaviour and stability is shown. [German]

Helms, H Ihme, J *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 567-577, 11 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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02 307687
AERODYNAMIC MEASUREMENTS MADE BY THE DB RESEARCH INSTITUTE IN MUNICH IN THE HEITERSBERG TUNNEL ON SWISS FEDERAL RAILWAYS [Aerodynamische Messungen der Bundesbahn-Versuchsanstalt Muenchen im Heitersbergtunnel der Schweizerischen Bundesbahnen]
With increased train speeds, problems of aerodynamics are arising. The question of running through tunnels is of particular relevance. Aerodynamic measurements were made when two trains passed each other in the CFF's Heitersberg tunnel. The express train (maximum speed 210 km/h) was composed of a DB 103 locomotive and 3 DB dynamometer coaches, and the slow train of the CFF Re 4/4 II locomotive and 7 coaches. The article describes the research programme and explains in detail the pressure rates selected on a number of runs. [German]

Gloeckle, H *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 591-596, 5 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

02 307689
THE INFLUENCE OF THE SUSPENSION ON THE HUNTING STABILITY OF RAILWAYS

On the basis of the linearized creep theory, a comprehensive analysis of the hunting stability of railway vehicles is given. The analysis includes the rigorous solutions of the relevant differential equations for a wheelset suspended in a roller rig; and two wheelsets acting against each other. It is shown that in a vehicle, wheelsets obtain their hunting stability from the combined (in series) action of the lateral and longitudinal suspension constraints. The derivations show that the hunting stability is dependent on the creep coefficient and a method is derived for the optimization of the suspension parameters in relation to the available creep.

Scheffel, H *Rail International* Vol. 10 No. 8, Aug. 1979, pp 662-696, 25 Fig., 4 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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02 307690
A STUDY OF THE PATTERN OF MOVEMENT OF WHEELSETS WITH COUPLED AXLE DRIVE ON DIESEL LOCOMOTIVES [Untersuchung der Bewegungsform von Radsatzen im Gruppenachsantrieb der Diesellokomotive]

No Abstract. [German]

Saburov, FF *DET Eisenbahntechnik* Vol. 27 No. 1, Jan. 1979, pp 21-23, 2 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

02 308257
AERODYNAMIC FORCES ON FREIGHT TRAINS-VOLUME IV WIND TUNNEL TESTS OF FREIGHT CARS AND NEW TRAILER AND CONTAINER CAR DESIGNS

The aerodynamics of freight trains has been the subject of a series of reports in a continuing investigation. Volume 1 reported on a wind tunnel investigation of trailer on flatcar and container on flatcar tests; Volume 2, a full scale test of trailers on flatcars; and Volume 3 covered the correlation of the full scale tests and wind tunnel tests. This Volume 4 reports on a wind tunnel investigation of a variety of freight car, locomotive, and new trailer and container car configurations. Aerodynamic forces have been measured on a variety of different railroad freight car configurations. The first configuration consisted of blocks arranged in a train and the tests were to obtain information on the interaction between the blocks for different spacings and height. Next, a series of railroad freight cars and locomotives were tested to obtain aerodynamic forces on them, both in a train of similar cars and with different cars. All cars were tested with a flatcar in the leading and trailing positions as a measure of the largest forces that might occur. The final series of tests were for various new railroad cars designed for trailers and containers. These cars were tested with their different design loadings.

Hammitt, AG
Hammitt (Andrew G) Associates, Federal Railroad Administration Final Rpt. FRA/ORD-76/295.IV, AGH 12-002-79, June 1979, 184 p., Figs., Tabs., 5 Ref.

Contract DOT-FR-8058

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02 308259
NUMERICAL DETERMINATION OF CONTACT PRESSURES BETWEEN CLOSELY CONFORMING WHEELS AND RAILS. TECHNICAL REPORT NO. 8

A numerical method is developed for the determination of the contact pressure that arises when two elastic bodies with closely conforming non-Hertzian frictionless surfaces are pressed together. The method is a generalization of that recently developed by the authors for the case of counterformal contact, and includes a technique for automatically generating meshes that overlay the changing (load-dependent) contact patches. The method has been implemented in a computer program called CONFORM, and has been applied to problems of wheel and rail contact. The results have been verified by comparison with those generated by an independent program for the special case of relatively light wheel loading, where the contact is known a-priori to be essentially counterformal. The results given herein for a relatively heavy (but realistic) wheel loading on the throat of the flange represent the first known solution for conformal contact between a railroad wheel and rail.

Paul, B Hashemi, J
Pennsylvania University, Philadelphia, Federal Railroad Administration Tech Rpt. FRA/ORD-79/41, MEAM Rpt. 79-4, July 1979, 28 p., 8 Fig., 3 Tab., Refs.

Contract DOT-OS-60144

ORDER FROM: NTIS

PB80-120462, DOTL NTIS, DOTL RP

02 308262
RAIL-WHEEL GEOMETRY ASSOCIATED WITH CONTACT STRESS ANALYSIS. TECHNICAL REPORT NO. 6

This report records 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. In particular, results utilized in the authors' computer programs COUNTACT (for COUNTerformal contACT problems) and CONFORM (for CONFORMal contact problems) are given. It is shown how the profile curves specified by engineering drawings for standard wheels and rails may be analyzed to find appropriate parameters 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. The basis of a computer program (MIDSEP) to determine this separation is described.

Paul, B Hashemi, J
Pennsylvania University, Philadelphia, Federal Railroad Administration Tech Rpt. FRA/ORD-78/41, MEAM 79-6, Sept. 1979, 27 p., Figs., Refs., 1 App.

Contract DOT-OS-60144

ORDER FROM: NTIS

PB 80-142656 DOTL NTIS, DOTL RP

02 308266
TRAIN OPERATIONS SIMULATOR-PROGRAMMER'S MANUAL

The Train Operations Simulator (T.O.S.) Computer Model simulates the performance of a train composed of diesel-electric locomotives and conventional freight cars. Its calculated performance parameters include speed and distance (as a function of time), quasi-dynamic coupler forces, and quasi-static L/V ratios. This report represents the programming manual documentation for the Train Operations Simulator, Release 3.

Low, EM Garg, VK
Association of American Railroads Technical Center AAR R-359, Mar. 1979, 163 p.

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

DOTL RP

02 308267
FLEXIBLE CARBODY VEHICLE MODEL--USER'S MANUAL, VERSION 2

A Mathematical Model "Flexible Carbody Vehicle Model" was developed in Phase I of Track Train Dynamics Program to simulate dynamic behavior of a conventional freight car equipped with constant column damping in trucks. This model is the second version of this model and includes the option for (a) constant column damped truck (b) variable column damped truck and (c) Swing Motion truck. The auxiliary snubbing devices of five types located below and/or above the bolster can be simulated. The dynamic behavior of a freight car can be studied on tangent or curved track in presence of various track perturbations. The critical component loading

situations can be determined under different operating environments to improve the design and enhance the safety in operation and maintenance.

Hussain, SMA Garg, VK Singh, SP
Association of American Railroads Technical Center AAR R-372, Apr. 1979, 136 p., Figs., 2 App.

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

DOTL RP

02 308268
LATERAL RESISTANCE OF SOME NEW AND RELAY RED OAK CROSSTIES
To explore the effect of in-service use, comparative lateral resistance tests were performed on eight red oak crossties--four 24-year-old relay (used) ties and four new ties. One end of each tie was tested individually and the other was tested in a four-tie-group test. The ties were tilted to a 1 in 2 slope and the rail was loaded plumb. Displacements of the rail head and base were recorded as a function of load. Measured wood properties of small specimens from the relay ties were found to be comparable to properties of specimens from the new ties. Only one tie (individual, new) had the spikes bend (into an S shape) during the lateral resistance tests, but the rail base displaced laterally less than 0.5 inch at an applied load of 130,000 pounds.

Murphy, JF
Forest Products Laboratory, Federal Railroad Administration Final Rpt. FRA/ORD-79/03, Sept. 1979, 67 p., Figs., Tabs., 4 App.

Contract DOT-AR-74337

ORDER FROM: NTIS

PB 80-127012 DOTL NTIS, DOTL RP

02 308269
RESISTANCE OF A FREIGHT TRAIN TO FORWARD MOTION--VOLUME II, IMPLEMENTATION AND ASSESSMENT
This interim report is a supplement to a previous report and documents the results of the second portion of an investigation of the train resistance phenomenon. This portion of the effort was specifically directed toward determination of possible fuel savings to be effected through certain design improvements or equipment modifications when a freight train is operated over normal track, including grades and curves. The results of 52 simulated runs of various freight trains over various tracks, both real and artificial, are reported. The simulations show that fuel savings are not directly proportional to reductions in train resistance and that under certain circumstances only a portion of the theoretically attainable fuel savings can be achieved. It is also shown that fuel savings attributable to certain of these modifications are quite dependent upon the nature of the operation in which they are used. Within limits, the computer program developed during this study can be used to determine the fuel consumption of an arbitrary train operated over an arbitrary track to perform sensitivity analyses with respect to locomotive assignment policy, operational speed limit, and the like, and to determine the effect of design improvements or equipment modifications upon fuel consumption under normal operating conditions. The computer program which performs the calculation is explained in detail and the rationale behind its development is given. An example of the results from a separate plotting routine, which plots from the data generated a velocity profile on which is superimposed the instantaneous fuel consumption rate, is given. Complete information on trains and tracks used to generate the material for the report is given in an appendix.

See also FRA/ORD-78/04.I, Volume I,--Methodology and Evaluation, published April 1978, and FRA/ORD-78/04.III, Volume III,--Sensitivity and Computer Program, to be published Summer, 1980.

Muhlenberg, JD
Mitre Corporation, Federal Railroad Administration Intrm Rpt. FRA-/ORD-78/04.II, MTR-79W00010, Apr. 1979, 164 p., Figs., Tabs., 15 Ref., 5 App.

Contract DOT-FR-54090

ORDER FROM: NTIS

PB 80-118326 DOTL NTIS, DOTL RP

02 308276
CONTACT STRESSES ON BODIES WITH ARBITRARY GEOMETRY, APPLICATIONS TO WHEELS AND RAILS. TECHNICAL REPORT NO. 7
A general formulation of frictionless contact stress problems is given. An inverse iterative method is introduced, which converts the problem to the solution of an integral equation subject to a boundary condition. By modifying the previously described simply discretized method, and by introducing an automatic mesh generating procedure for the changing contact region, it has been possible to solve the integral equation for pressure distribution and the contact patch, numerically. The method has made major improvements in the generality, stability, accuracy and efficiency of the numerical procedure. The method has been verified by comparison with known solutions for the Hertzian case. Several numerical examples of counterformal and conformal problems have been solved, which include the first known solutions of non-Hertzian counterformal and conformal contact of a railroad wheel and rail. The mesh generation and boundary iteration procedure introduced is applicable to a wider class of problems with changing boundaries, such as: determination of wheel-rail adhesion-slip boundary, determination of elastic-plastic interfaces for residual stress problems, etc.

Hashemi, J Paul, B
Pennsylvania University, Philadelphia, Federal Railroad Administration Tech Rpt. FRA/ORD-79/23, MEAM Rpt. 79-2, Apr. 1979, 130 p., Figs., Tabs., 18 Ref.

Contract DOT-OS-60144

ORDER FROM: NTIS

PB-299409/AS, DOTL NTIS, DOTL RP

02 308277
TRUCK DESIGN OPTIMIZATION PROJECT PHASE II. ANALYTICAL TOOL ASSESSMENT REPORT
One of the objectives of the Truck Design Optimization Project (TDOP) Phase II is to define the performance of newer Type II freight car truck designs versus the standard, three-piece Type I truck. To accomplish this dynamic performance evaluation, TDOP Phase II will utilize field test data and analytical tools. The analytical tools, consisting primarily of freight car truck simulation models and their supporting computer programs, will be used to extend and interpret the field test results. The purpose of this report is to document the selection of candidate analytical tools from existing models and computer programs for validation and for use in TDOP Phase II. This report establishes the assessment criteria, surveys 59 existing analytical tools, evaluates in detail 16 of the more promising, and from these, selects a set of tools for validation and subsequent use on TDOP Phase II.

The TDOP Phase II Analysis Plan (FRA/ORD-78/34) is a companion document to this report.

Johnson, L Gilchrist, A Healy, M Bush, C Sheldon, G
Wyle Laboratories, Federal Railroad Administration Tech Rpt. FRA-/ORD-79/36, TDOP Tech Rpt. TR-06, Aug. 1979, 57 p., Figs., Tabs., 1 App.

Contract DOT-FR-742-4277

ORDER FROM: NTIS

PB80-104888, DOTL NTIS, DOTL RP

02 308443
AUTOMATIC DATA ACQUISITION AND PROCESSING OF TRAIN DECELERATION FOR RAPID TRANSIT TRAIN SYSTEMS
A microprocessor-based computer system has been developed for the dedicated acquisition of data associated with the deceleration characteristics of trains in a rapid transit system. The computer collects braking profiles (velocity and position) along a 4325-ft. section of track prior to station entry, at one-foot intervals. These data, occupying a volume of about 8K bytes per train, are stored on tape and transmitted to a remote microprocessor during non-revenue periods. The remote computer archives these data, and performs data reduction and analysis. Results are useful as a monitor of braking performance, and enable a statistical inference of braking distances under various ambient and train-related conditions.

Proceeding Annual Conference ACM Washington, D.C., December 4-6, 1978.

Rothbart, G (Science Applications, Incorporated); Fullwood, R Conde, HO
Association for Computing Machinery Conf Paper Vol. 2 1978, pp 612-616

ACKNOWLEDGMENT: EI
ORDER FROM: Association for Computing Machinery, 1133 Avenue of the Americas, New York, New York, 10036

03 181426
IMPROVED PASSENGER EQUIPMENT EVALUATION PROGRAM TECHNOLOGY REVIEW. SEMIANNUAL REPORT
The status of two foreign rail technologies is analyzed in this second of four semiannual reports. The two technologies are Trucks and Carbody Construction. Trucks are discussed from the viewpoint of their function in the rail vehicle suspension system. This function consists of vehicle guidance, vibration isolation, vehicle support, and traction and braking. Several current trucks are reviewed, followed by a discussion of radial-axle trucks. Carbody construction is reviewed from 1965 forward. French technology, 1965 to 1975, is covered, followed by discussion of two modern trains, the TGV (France) and the ET403 (Germany). Advanced technologies are then discussed, principally construction with aluminum extrusions followed by a short discussion of composite materials.

See also PB-277264. Prepared in cooperation with Klauder (Louis T.) and Associates, Philadelphia, Pa., and Carnegie-Mellon Univ., Pittsburgh, Pa.

DeVilliers, AL Dow, AL Watson, RB Uher, RA
Unified Industries, Incorporated, Klauder (Louis T) and Associates, Carnegie-Mellon University, Federal Railroad Administration FRA-/ORD-78/38, May 1978, 89 p.

Contract DOT-FR-74249

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-283659/1ST, DOTL NTIS

03 197652
URBAN RAPID RAIL VEHICLE AND SYSTEMS PROGRAM
This sixth Annual Report describes the work accomplished and summarizes pertinent technical and design data. The objective of the Program is to enhance the attractiveness of rail rapid transit to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe, and economical as possible. Three major hardware tasks were active during this reporting period, namely: the State-of-the-Art Cars (SOAC), the Advanced Concept Train (ACT-1), and the Advanced Subsystem Development Program (ASDP). Accomplishments for the year ending September 1977 included the following: Completion of the PATCO revenue service program; Delivery of the first ACT-1 car to the DOT Transportation Test Center; Fabrication and developmental testing of the components for the Advanced Sub-systems Development Program including the self-synchronous propulsion system, the monomotor truck and the synchronous brake system.

See also PB-266096.

Boeing Vertol Company, Urban Mass Transportation Administration Ann. Rpt. UMTA-IT-06-0026-78-1, Oct. 1977, 112 p.

Contract DOT-UT-10007

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-295124/2ST

03 199064
WMATA RAPID TRANSIT VEHICLE ENGINEERING TESTS
TSC has been instrumental in preparing standardized test procedures for evaluation of rail transit vehicles, using the TTC's 9.1 mile Transit Test Track, with the objective of providing a common baseline for the comparative evaluation of rapid transit vehicles and vehicle systems. The test program reported herein was carried out by the TTC to the guidelines of these procedures. The test program data gave a comprehensive evaluation of the WMATA rapid transit car in the categories of Performance, Power Consumption, Spin/Slide Protection, Noise, Ride Roughness, Power System Interactions, and Simulated Revenue Service.

Simmonds, KJ Henderson, FH
Federal Railroad Administration, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UM-TA-79-8, May 1979, 122 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298978/8ST, DOTL NTIS

03 199112
ANALYSIS OF DATA FROM THE FIRST WHEEL EXPERIMENT AT THE FACILITY FOR ACCELERATED SERVICE TESTING (FAST)
The Facility for Accelerated Service Testing (FAST), located at the Transportation Test Center near Pueblo, Colorado, is a joint government-/industry program for accelerated life cycle testing of railroad track and mechanical components. The facility consists of a 4.8-mile loop around which a freight train of approximately 9,500 tons travels for 15 hours per day, 5 days per week. Measurements are taken periodically on various track and train components for the purpose of studying design performance and wear characteristics. As part of this overall program, a wheel experiment was designed to compare the performance of various types of wheels now in service on U.S. railroads. This report discusses an analysis of wheel wear data from the first wheel experiment, which ran from September 1976 to August 1977. Six wheel variables (heat-treated versus non-heat-treated, cast versus wrought, 1-wear versus 2-wear, AAR profile versus CN profile, 14-inch center plate versus 16-inch center plate, and type 1 truck versus type 2 truck) were studied. The analysis includes graphical analysis and the development of a regression model for studying variable interactions.

Errata sheet inserted.

Larsen, KW
Unified Industries, Incorporated, Federal Railroad Administration Intrm Rpt. FRA/TTC-79/01, July 1979, 36 p.

Contract DOT-FR-8046

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299433/3ST

03 300565
BN'S NEW ALLIANCE SHOP: BIG, CAPABLE, EXPANDABLE
Burlington Northern, confronted with rapidly growing coal traffic from Wyoming and Montana to the Midwest and South, has established a major locomotive and car maintenance shop along this route at Alliance, Neb. The shop could soon be maintaining 650 locomotive units in a 9-track facility and the four-track section for one-spot car repairs has capacity for 120 cars per day.

Welty, G *Railway Age* Vol. 180 No. 15, Aug. 1979, p 40, 8 Phot.

ORDER FROM: ESL

DOTL JC

03 300570
THERMAL PROTECTION STANDARDS FOR RAILROAD TANK CARS
As a result of a series of serious railroad accidents involving certain uninsulated pressure tank cars transporting hazardous materials, the specifications for railroad tank cars were amended in the interest of safety. Specification 112 and 114 tank cars used to transport flammable gases such as propane, butane, and vinyl chloride are required to have both thermal and tank head protection. Newly built cars must be so equipped starting on January 1, 1978, and existing cars must be retrofitted before December 31, 1981.

Hilado, CJ Brauer, DP *Journal of Thermal Insulation* Vol. 2 Oct. 1978, n.p., 1 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 300571
ROLLING STOCK FOR MASS TRANSPORT [Materiale rotabile per trasporti rapidi di massa]
For the rail systems which represent the supporting element of the transport system in metropolitan areas, the rolling stock, with rare exceptions, is obsolete and causes dissatisfaction on the part of the users, giving rise to high operating costs. From this there arises the necessity for modernization, which essentially represents a problem of financing. The technical evolution of rail stock, today very rapid, must take account of traction requirements; of great significance was the introduction of electronics and the use of lightweight structures. For the means destined for commuter services, the deep comparison between the diverse possible solutions has made it possible to perfect a type of railcar with the body in light alloy and chopper equipment, characterized by a considerable flexibility of use and economical

operation. A description of the new type of car, its design and mechanical and electronic equipment, is presented. [Italian]

Perticaroli, F *Ingegneria Ferroviaria* Vol. 33 No. 12, Dec. 1978, p 1039

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

03 300589
THE MOST RECENT "CORAIL" COACHES [Les dernieres nees des voitures "Corail"]
Main innovations and modifications to "Corail" coaches since their introduction: couchette coaches, European standard coaches, wide coaches, composite coaches and coaches with raised driving cabins for running reversibility. [French]

Caire, D *Chemins de Fer* No. 335, Mar. 1979, pp 51-75, 9 Tab., 35 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Association Francaise des Amis des Chemins de Fer, Gare de l'Est, 75475 Paris, France

03 300619
FAILURE DATA ANALYSIS FOR TRANSIT VEHICLES
This paper describes an effort to create a data base for the reliability of transit vehicles and their components. Failure data on approximately 500 subway cars, 400 streetcars and 1100 buses was obtained from the Toronto Transit Commission. The results of the analysis of this data are summarized in this paper and reference to more detailed information is provided.

Proceedings of the Annual Reliability and Maintainability Symposium, Washington, D.C., January 23-25, 1979.

Singh, C (Ontario Ministry of Transportation & Communic, Can) Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1429-OR, 1979, pp 308-313, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

03 300736
TEST STAND FOR STATIC STRENGTH TESTS OF RAIL VEHICLE BODIES
The basic unit of the test stand type ZDV 500 is a longitudinal direction variable horizontal frame, suited for rail vehicles up to a length of 30 m. With this frame, applications of horizontal tension or compression forces will be realized. Load portals permit forces on the end walls of test vehicles. For application of vertical loads at any point of the vehicle floor, single trestles are mounted on the foundation. With this stand, at which the forces are mainly hydraulically generated, strength investigations can be accomplished. Modern instruments enable the measurements and recordings of strains and deformations which will be evaluated by electronic data processing machines. [German]

Bittner, H *Die Bundesbahn* Vol. 27 No. 3, Mar. 1979, pp 119-121

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

03 301148
THE URBAN RAPID TRANSPORT CARRIAGE TYPE M OR N-A VEHICLE SUITABLE FOR TUNNEL AND STREET OPERATION [Der Stadtbahnwagen M bzw. N-ein Fahrzeug fuer den Startbahn-Vorlaufbetrieb Tunnel-Strasse]
The M-carriage in the Ruhr region (a metre gauge metropolitan railway) has been developed by the traffic authorities in the Ruhr together with the coach building and electrical industries, for use both in tunnels and on streets in sections of the existing tramway network. The modern equipment and the high state of technology are dealt with in this paper. No noticeable difference in comfort has been noted by the passengers on this metre gauge vehicle when compared to the steadily expanding normal gauge urban rapid transport network for the former metre gauge tram routes. [German]

Herbrich, J Spathmann, M (Bochum-Gelsenkirchener Strassenbahn Ag) *Internationales Verkehrswesen* Vol. 30 No. 2, Mar. 1978, pp 123-126, 2 Fig., 1 Tab., 3 Phot., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307807), 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

03 301171
NEW REVERSIBLE TRAINSET FOR THE SUBURBAN RHINE-RUHR NETWORK [Neuer S-Bahn-Wendezug fuer den Ballungsraum Rhein-Ruhr]
Presentation of the new reversible trainsets introduced on the Rhine-Ruhr S-Bahn. Normal composition: E 111 specially equipped locomotive, a coach with a driver's cab, a composite 1st/2nd class coach, one or more 2nd class coaches. Coaches are in light alloy with wide doors, and stress is placed on comfort and air conditioning.

Felsing, A *Eisenbahntechnische Rundschau* Vol. 28 No. 3, Mar. 1979, pp 167-174, 11 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 301321
APPLICATION OF LIGHT-RAIL TRANSIT VEHICLES
Flexibility is the primary concept associated with light-rail transit (LRT). This flexibility includes its application, implementation, operation, and capacity and has clear implications for light-rail vehicle (LRV) design, since the capabilities of a vehicle selected for a specific system must meet the requirements of that system. The thesis of this paper is that all such LRT requirements can be met by a family of vehicle designs based on standardized subsystem componentry. System requirements are dealt with in four categories--capacity, geometry, performance, and impact; the vehicle components include the car-body alternatives; it is shown that the use of single-ended LRVs is desirable whenever system characteristics permit and that articulation is properly used to solve clearance rather than capacity problems. The Toronto Transit Commission's ordering of new LRVs is used to illustrate the process of selecting vehicle attributes that meet the system requirements and the process of moving from a definition of desirable vehicle characteristics through development and testing to car delivery. The ability to derive several vehicle designs from the basic design is discussed in the context of ongoing development activities in order to prove the feasibility of the family-of-vehicles idea. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Gray, AR (Urban Transportation Development Corporation) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 137-141, 2 Fig., 3 Ref.

ORDER FROM: TRB Publications Off

03 301413
DEVELOPMENT OF A NEW WAGON FOR THE HORIZONTAL TRANSFER OF LORRIES AND SEMI-TRAILERS [Die Entwicklung eines neuen Huckepackfahrzeugs fuer horizontale Verladung von Lkw's und Sattelzuegen]
The development of combined transport in Federal Germany calls for the design of a new car for piggyback operations. Initial requirements are for 800 cars and the article lists the criteria laid down: low investment and maintenance cost, favorable payload to tare ratio, even bearing surface, speed of 120 km/h. The article describes the new "Talbot" low-loader which is consistent with the requirements of piggyback operators. [German]

Lehmann, E *Internationales Verkehrswesen* Vol. 31 No. 2, Mar. 1979, pp 98-102, 5 Phot.

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

03 301425
TGV TRAINSETS TESTED FOR EIGHT MONTHS [8 mois d'essai des rames TGV]
A review of results of the programme of tests prepared in agreement with the constructors and carried out on the two pre-production TGV trainsets. Performance and endurance tests were satisfactory on the whole, and have enabled the specialists to determine optimum conditions for minor changes and final adjustments of the equipment before mass production. [French]

Garde, R *Revue Generale des Chemins de Fer* Vol. 98 May 1979, pp 227-232, 10 Phot., 1 Ref.

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

DOTL JC

03 301437
MK3 SLEEPERS TO REJUVENATE LONG-HAUL OVERNIGHT SERVICES
British Railways is acquiring over 200 new sleeping cars for replacement of units built in the late 1950s and early 1960s. Based on Mk3 cars designed for high-speed service, the new sleepers will be of 13-berth and 12-berth designs that will normally operate in pairs with a single attendent. Status of present overnight services and future prospects are described.

Perren, B *Modern Railways* Vol. 36 No. 371, Aug. 1979, pp 335-338, 10 Phot.

ORDER FROM: ESL

DOTL JC

03 301722
A CONTRIBUTION TO THE ASSESSMENT OF DISTORTIONS AND SECTIONAL LOADS ON RAILWAY UNDERFRAMES SUBJECTED TO DYNAMIC STRESS [Ein Beitrag zur Berechnung von Verformungen und Schnittlasten an Eisenbahn-Untergestellen unter dynamischer Belastung]
No Abstract. [German]

Reich, O *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 26 No. 1, 1979, pp 85-88, 2 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

03 301811
STUDY OF CRACK INITIATION IN 100-TON COAL CAR TRUCK BOLSTERS
CP Rail has experienced an increase in cracks in the truck bolsters of 100-ton coal cars in the vicinity of the snubber pocket. Three areas were investigated: Field tests determined actual stresses in the pocket area; nondestructive tests using gamma rays studied effect of casting shrinkage cavities at critical cross sections which could lead to fatigue cracking; metallurgical analyses of welded areas in pockets determined microstructural changes. It was found that dynamic and static stresses were not sole reasons for failure. A major cause of fatigue cracking was shrinkage cavities, the result of a basic error in casting design. In addition to redesign and change in pouring techniques, it was recommended that a new alloy plate be placed between bolster and snubber surface, and that the procedure for welding such plates be changed to either incorporate normalizing or that notch-tough reinforcements and arrester plates be utilized.

Ghonem, H
Canadian Pacific S561-78, TP 1681, Mar. 1978, 63 p., 29 Fig., 5 Tab., 19 Ref.

ORDER FROM: Canadian Pacific Limited, Research Department, Windsor Station, Montreal, Quebec H3C 3E4, Canada

03 301821
ALUMINIUM TRAINSETS WILL INTEGRATE CROSS-PARIS SERVICES
Integration of commuter service over Paris rapid transit and French National Railways lines requires rolling stock capable of operating from two power supplies and variations in platform height. The hybrid design incorporates features from existing SNCF and RATP trainsets, and features lightweight bodies, chopper control and automatic changeover between 1.5 kV dc and 25 kV ac.

Railway Gazette International Vol. 135 No. 9, Sept. 1979, pp 827-829, 4 Phot.

ORDER FROM: ESL

DOTL JC

03 302167
FABRICATED TRUCK FOR FREIGHT CARS
A welded one-piece-frame freight car truck, an American adaptation of the UIC Y25 design, has been undergoing approval for AAR interchange service. The truck is a product of an Italian firm, being known as the Maxiride fabricated truck in the U.S. Laboratory tests have been completed and road tests with two, then ten, box cars fitted with the trucks will be conducted.

Progressive Railroading Vol. 22 No. 9, Sept. 1979, pp 116-118, 5 Phot.

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

DOTL JC

03 302334
THE PROTOTYPE OF THE NEW LOW-LOADER PIGGYBACK CARS FOR HUPAC AND THE CFF [Der Prototyp fuer die neuen Huckepack-Niederflurwagen "Rollende Autobahn" der HUPAC SA/SBB]
As part of the overall Swiss transport plan, the CFF has collaborated with the HUPAC Company in studying a new low-loader car. The author explains the technical constraints and the design selected as a result. He particularly describes the braking and running gear. [German]

Marti, K *Glasers Annalen ZEV* Vol. 103 No. 6, June 1979, pp 268-276, 19 Phot.

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

DOTL JC

03 302694
RAIL PASSENGER SEAT STRENGTH TESTING
This report describes strength testing, conducted by T E S Limited, on five different makes of rail passenger seats. These tests were conducted for the Transport Canada Research and Development Centre using the "Rail Passenger Seat Testing Specification-Strength Requirements". As a result of these strength tests, the five seat makes have been ranked, in order of overall strength. If appropriate modifications are carried out, the strength integrity of the final production model of the Transport Canada commissioned seat should be equal to that of the Aircraft Mechanics Inc. and Delta seats.

T E S Limited, Transport Canada Research and Development Centre TES Rpt. No C198-1, July 1978, 65 p., Figs., Tabs., 5 App.

ORDER FROM: T E S Limited, 2548 Sheffield Road, Ottawa, Canada

DOTL RP

03 302721
THE ASSEMBLY OF WHEELSETS. PROBLEMS OF METHOD AND DESIGN [Das Fuegen von Eisenbahnradsaetzen. Fragen des Verfahrens und der Gestaltung]
Wheelsets were previously assembled by longitudinal pressing, but increasing use is now being made of transverse pressing and adhesive shrinking. The author describes and compares the three methods, stating a preference for transverse pressing and more particularly shrinking. He shows that the higher bending stresses in and near the wheel-seat offer interesting possibilities in respect of safety and lighter construction. [German]

Brinkman, P *Eisenbahntechnische Rundschau* Vol. 28 No. 6, June 1979, pp 479-485, 1 Tab., 6 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 302722
LIGHT CONSTRUCTION IN ALUMINUM OR STEEL FOR SUBURBAN RAIL TRANSPORT? AN ECONOMIC ALTERNATIVE [Aluminium-oder Stahl-Leichtbau fuer den Nahschnellverkehr Der Eisenbahn? Eine wirtschaftliche Alternative]
One of the main advantages of light construction is that it saves energy. This article does not take account of vehicle operating profitability from purchase up to withdrawal from service, including maintenance and track costs. Particular attention is paid in the evaluation process to the economic viability of the aluminium and steel-built coach for fast suburban traffic. The discussion touches on savings made with suburban trains hauled by locomotives and with suburban motor trainsets. [German]

Kilb, E *Leichtbau der Verkehrsfahrzeuge* Vol. 23 No. 3, May 1979, pp 53-60, 6 Tab., 11 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

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

03 302725
CALCUALTION PROCESS FOR MOTOR TRAIN-SET SUSPENSION [Motorvonatok rugorendszerenek sulyszamitassal kiegeszitett szamitogepes]
Presentation of a method that can be used to calculate the weight and the pressures exerted on railway axles. The article also explains the principle of functioning of the Ganz-MaVAG universal truck spring system. [Hungarian]

Bela, K *Jaermuevek, Mezoegazdasagi Gepek* No. 1, 1979, pp 9-15

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

03 302727
SANDBLASTING RAILWAY ROLLING STOCK [Das Strahlen von Eisenbahn-Rollmaterial]
Even the best rust protection coating on railway rolling stock becomes useless when the metal underneath it starts to rust. Protective coatings can only be efficient when they are applied to adequately prepared surfaces. The author mentions the quality criteria imposed on surfaces treated by sand blasting and goes on to describe the rust removal and sand blasting methods used for old and new railway vehicles. [German]

Horowitz, I *Eisenbahningenieur* Vol. 30 No. 6, June 1979, pp 270-280, 17 Phot., 5 Ref.

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

03 303170
WROUGHT WHEEL DESIGN FOR HEAVY AXLE LOAD UNIT TRAINS
The application of finite element analysis techniques permits the determination of both thermal and mechanical stress distributions in a heavy axle load unit train wheel design. Residual stress levels, which are dependent on wheel design and heat treatment, must be analyzed by experimental methods, as these stresses dominate the service stress distribution in the wheel. Residual stress levels also directly affect both crack growth rates and critical defect size. Fracture toughness levels can be improved by attention to steelmaking and heat treatment techniques to give enhanced performance of the high carbon wheel material.

Long, G (Commonwealth Steel Company, Australia) *BHP Technical Bulletin* Vol. 22 No. 2, Nov. 1978, pp 27-32, 17 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Broken Hill Proprietary Company Limited, 140 William Street, Melbourne 3000, Victoria, Australia

03 303189
EVALUATION OF THE PREPARATORY HIGH SPEED TESTING JUSTIFICATION FOR THE PRE-SERIES TRAIN SETS AND THEIR BENEFITS
The paper deals with the time scale and the development of the high speed rolling stock, the coherence of the high speed tests, and the contribution from the Paris-South-East pre-series sets of French National Railroads.

Bernard, J-P (French National Railways); Senac, G *French Railway Techniques* Vol. 21 No. 1, 1978, pp 73-78

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

03 303190
STRUCTURE AND FITTING OUT OF THE VEHICLE BODIES
The paper deals with the problems which have to be solved in connection with the bodies and bogies of the vehicles, namely: the structure itself; the achievement of good aerodynamic properties; and the standard of passenger comfort and hence the internal fittings. Articulation, the body structure for the trailers other than the end trailers, the body structure for the end trailers, the application of aerodynamic techniques, the passenger facilities, and the power car are discussed.

Tachet, P (French National Railways); Boutonnet, J-C *French Railway Techniques* Vol. 21 No. 1, 1978, pp 91-99

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

03 303191
NEW GENERATION OF ROLLING-STOCK, THE MF 77, FOR THE PARIS METROPOLITAN RAILWAYS
Progress achieved for the improvement of passenger comfort and new construction technique for the vehicle bodies utilizing aluminum are discussed.

French Railway Techniques Vol. 21 No. 2, 1978, pp 121-127

ACKNOWLEDGMENT: EI
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03 303194
SUBURBAN AND REGIONAL HAULED RAILWAY TRANSPORT TRAIN SETS IN STAINLESS STEEL FOR THE SNCF SYSTEM
Constituents of the train sets, general and constructional characteristics, interior fittings and technical arrangement of the new stainless steel train sets are discussed.

French Railway Techniques Vol. 21 No. 4, 1978, pp 256-263

ACKNOWLEDGMENT: EI
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03 303199
NEW 2ND CLASS COACHES WITH COMPARTMENTS ON THE FRENCH NATIONAL RAILWAYS [Les nouvelles voitures de 2ieme classe a compartiments de la SNCF]
The article explains the economic and commercial considerations which led the French National Railways to design a sufficiently comfortable 8-seat 2nd class compartment with air conditioning and a body expanded to the maximum permitted by the clearance gage. [French]

Jousserandot, P Tachet, P *Revue Generale des Chemins de Fer* Vol. 97 Nov. 1978, n.p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

03 303208
AMTRAK "THE MOST MODERN PASSENGER-TRAIN YARD IN THE WORLD"
Chicago Yard Upgrading Program is discussed. Diagram presented shows the layout of track and facilities in Amtrak's Chicago maintenance yard, modernization of which will be completed in 1980.

Railway Age Vol. 180 No. 1, Jan. 1979, pp 20-21

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

03 303210
ATLANTA RAPID TRANSIT CARS
The Metropolitan Atlanta Rapid Transit Authority (MARTA) is in the process of procuring cars. These cars are of welded aluminum extrusions, 75 feet long, and are powered by a chopper modulated 750 volt third rail propulsion system. Certain unique features are discussed in detail, including the method of body construction, reliability, noise levels, the cooling of propulsion equipment, and auxiliary voltage regulation. The test program is outlined and the significant results to data summarized. Most difficulties have been of a second order nature, but testing has taken longer than had been anticipated. A recommendation is made to provide more time for testing on future procurements, or to plan operations using other than new equipment.

Taylor, TS *Society of Automotive Engineers Preprints* SAE 790367, 1979, 11 p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 303211
PENALIZE THAT DAMNABLE ISO FREIGHT CONTAINER, EUROPEAN RAILROADS DEMAND
One of the most controversial aspects of the world wide "container revolution" is the issue of modular standardization of the various elements of the world's physical distribution system. This article focuses on the European railroads' attempts to impose its own modular standard on the ISO Series One freight container system and other modes of intermodal transport. The author notes that despite financial ill-health, the European railroads continue to advocate use of the 1200 x 800 mm pallet size which fits their smaller box cars, while resisting use of the low-cost intermodal freight container. The basic question boils down to which should be the basis of the ISO's "modular brick": the European railroad box car or the more universal ISO Series One freight container? The article documents efforts by the United States and the United Nations to settle this question through compromise; efforts which, so far, have resulted in a stalemate. The article also provides a detailed exploration of the pros and cons of the metric versus the ISO Series One standards. Charts depict a comparison of unit-load sizes by dimensional features and a comparison of package engineering qualities.

Schultz, GV *Container News* Vol. 14 No. 10, Oct. 1979, p 52

ORDER FROM: Communication Channels, Incorporated, 6285 Barfield Road, Atlanta, Georgia, 30328

DOTL JC

03 303586
HIGH-PERFORMANCE DMU PROTOTYPES PROMISE COMMUTERS A SMOOTH RIDE
British Railways is completing prototype Class 210 diesel-electric multiple-unit sets of three and four cars. Diesel-alternator sets, mounted above the floor, drive traction motors intended as standard for new electric multiple unit sets also. The DEMUs are designed as replacements for commuter services now worked by diesel-mechanical units. The new Class 210 has a maximum speed of 145 km/h and can run in multiple with late EMU stock. Not only does pneumatic suspension produce comfort standards matching those of latest EMUs, but two types share many common design features and components.

Wakefield, FHG (British Rail) *Railway Gazette International* Vol. 135 No. 12, Dec. 1979, p 1111, 3 Fig.

ORDER FROM: ESL

DOTL JC

03 303601
A METHOD OF OBTAINING DETAILED FREIGHT CAR TRUCK LOADING DATA
A method of obtaining freight car truck loading data utilizing a strain gaged truck bolster as a load cell is described. Analysis necessary to derive both the magnitude and location of the line of action of the freight car body vertical load resultant is presented. Techniques for cycle counting applicable to fatigue studies are suggested. Sample data from actual service testing are presented.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Spencer, CP Pitchford, TL (American Steel Foundries)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-3, Aug. 1979, 8 p., 13 Fig., 4 Ref.

ORDER FROM: ESL

03 303603
PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1978-79) 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 worldwide developments. In the freight area, developments are mainly aimed at the transport of bulk materials. The passenger developments cover improved concepts in commuters, rapid transit and light rail vehicles.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Manos, WP Ainsworth, M (Manworth Associates)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-5, Aug. 1979, 7 p., 23 Fig.

ORDER FROM: ESL

03 303606
OPTIMIZING THE FORKLIFT TRUCK LOAD CASE FOR BOX CAR SIDE GIRDER DESIGN
The Association of American Railroads specifies capacity and geometry for lift trucks which must be considered in box car side girder design. The designer's problem is to locate the lift truck in the doorway at the location which will result in a maximum state of stress. This paper outlines an exact method for determination of the critical lift truck location for symmetrical side girder. Also discussed is an approximate method which determines the critical lift truck location as a function of door opening width and truck centers.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Kinnecom, PG (Association of American Railroads)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-8, Aug. 1979, 8 p., 7 Fig., 2 Tab., 7 Ref.

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03 303611
EFFECT OF CRACKED RIBS ON STRENGTH OF FREIGHT CAR TRUCK BOLSTERS
Truck bolsters developed cracks in internal ribs under the center plate in service. A finite element analysis and laboratory stresscoat, strain gate tests were conducted to determine the effect of these cracks on bolster stresses. The influence on bolster stresses of an elastomeric cushioned body center plate with improved load distribution was also examined. Good correlation was obtained between theoretical analysis, laboratory tests and service conditions. Conclusions are drawn regarding the serviceability of cracked bolsters.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Cooley, DB (Standard Car Truck Company); Brown, J (Midland-Ross Corporation); Irwin, HD (Du Pont de Nemours (EI) and Company, Incorporated)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-13, Aug. 1979, 9 p., 17 Fig., 2 Ref.

ORDER FROM: ESL

03 303612
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 program was developed which provided the response to parametric modifications upon the critical speed of a car. The results of the parametric studies compared favorably with previous test knowledge. It was found that by modifying the resistance to parallelogramming or warp stiffness, a simple truck design could preclude truck hunting. The paper discusses the results of laboratory tests which were performed to measure stiffness and damping parameters and to evaluate alternative design proposals. Road tests were run to further validate the computer model and determine the critical speed of a car with an increased warp stiffness. Finally, a modified design of the conventional three-piece truck is proposed.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Hawthorne, VT (Railroad Dynamics, Incorporated)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-14, Aug. 1979, 18 p., 27 Fig., 5 Tab., 29 Ref.

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03 303615
PROGRESS IN RAILWAY MECHANICAL ENGINEERING: 1978-1979 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, 1978 to September 1, 1979. Data and photographs for ten new diesel locomotives, three new electric locomotives and two trainsets are presented as reported by builders and trade journals.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Baker, PH Schulze, FW (General Electric Company)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-17, Aug. 1979, 7 p., 11 Fig., 2 Tab., 9 Ref.

ORDER FROM: ESL

03 303623
PLASMA FUSION CUTTING AND GAS-SHIELDED ARC WELDING WITH PULSATING DIRECT CURRENT FOR REPAIR OF ALUMINUM RAIL VEHICLES [Plasmaschmelzschneiden und Schutzgasschweissen mit pulsierendem Gleichstrom bei der Reparatur von Schienenfahrzeugen aus Aluminium]
No Abstract. [German]

Pahl, E *Eisenbahningenieur* Vol. 30 No. 8, Aug. 1979, pp 350-356, 13 Phot., 8 Ref.

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

03 303650
MAINTENANCE OF A MODERN WAGON FLEET (B)
Unscheduled breakdowns and high cost areas are monitored, and efforts are made to improve the reliability of the components concerned, as well as increasing fleet efficiency and reducing overall rail transportation costs. Several areas are highlighted where, recently, safety and reliability have been improved and cost reduced. Finally, maintenance cannot be divorced from new design, and a brief description is given of the present ideas being introduced in new vehicles to improve their all-round safety and efficiency.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Haines, GC
Mechanical Engineering Publications Limited Conf Paper 1979, pp 33-35

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

03 303651
SUSPENSION DEVELOPMENTS ON TWO AXLE AND BOGIE WAGONS (B)
An improved understanding of vehicle dynamics, response to various track features and curving performance, now facilitates the design and development of freight suspensions which meet required ride performance standards and minimize maintenance, particularly through reduced wheel and flange wear in curving. The paper illustrates the application of these techniques to 2-axle and bogie suspensions and suggests how, by minimum modification, the performance of existing 2-axle vehicles, incorporating laminated springs, may be improved. The development of the cross-braced freight bogie is presented and the results obtained from the test running of the experimental bogies are discussed.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Stephenson, JE (British Railways Board); Mitchell, JR
Mechanical Engineering Publications Limited Conf Paper 1979, pp 19-28, 11 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

03 303652
SUSPENSION DEVELOPMENTS ON TWO AXLE AND BOGIE WAGONS (A)
This paper reviews the progress in design and manufacture of wagon suspensions made by the private sector of the industry, over the last decade. A selection of freight bogies, and two axle wagon suspensions currently available, are described and illustrated, and areas in which future developments may be concentrated are discussed.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Morris, RS
Mechanical Engineering Publications Limited Conf Paper 1979, pp 13-18

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

03 303653
DESIGN OF WAGONS FOR SPECIAL COMMODITIES
The paper outlines the way in which different commodities affect wagon design, and pays special attention to the transport of liquids, gases, powdered and granulated products, palletized goods including cans and bottles, drums, steel billets, coils and steel plate traffic, motor cars and containers. Consideration is given to the factors dictating payload capacity, operating constraints and safety during transit, together with those technical features which are required to ensure that new freight traffic meets the future requirements for operating on BR and in international services.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Smith, AD
Mechanical Engineering Publications Limited Conf Paper 1979, pp 5-11, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

03 303655
SAFE AND EFFICIENT FREIGHT TRANSPORT BY RAIL
Six papers by various authors are presented, four of which are indexed and abstracted separately. The topic discussed is rail freight cars of all types, with particular emphasis on suspension developments on two axle and bogie wagons, and cars for special commodities.

Institution of Mechanical Engineers Conference Publication 1979-1, Safe and Efficient Freight Transportation by Rail, London, England, March 1, 1979.

Mechanical Engineering Publications Limited Conf Paper 1979, 35 p.

ACKNOWLEDGMENT: EI
ORDER FROM: Mechanical Engineering Publications Limited, 1 Birdcage Walk, London SW1H 9JJ, England

03 303693
A DRAFT GEAR EVALUATION PROJECT APPLIED TO HEAVY UNIT TRAIN OPERATIONS
A Draft Gear Evaluation Project has been undertaken by Mt. Newman Mining Co. Pty. Limited. It aimed at specifying a gear which will perform satisfactorily in the Company's heavy unit train service. The project resulted because large scale draft gear failures occurred soon after railing operations commenced, and no long term solution for this costly problem could be found. By testing eight different makes and models of gears in actual service conditions (mainline operation and indexing for rotary dumping), suitable bases of comparison were developed. These depart from existing AAR methods and include a measure of the fatigue damage each gear allows to be inflicted on ore car drawgear. Computer simulation was used also, allowing investigation of the effects of using one type of gear only in a whole train. Output showed the predicted magnitude of coupler forces, and hence allowed estimation of the protection the draft gear would give against fatigue damage of the drawgear.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

West, LE Williams, CG (Mt. Newman Mining Company Pty Ltd, Australia); Kerr, AJ (Western Australia University, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 305 Pap D.5, 1978, pp 1-5, 5 Fig., 2 Ref.

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

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03 303697
EXPERIENCE GAINED BY SOUTH AFRICAN RAILWAYS WITH DIAGONALLY STABILISED (CROSS-ANCHOR) BOGIES HAVING SELF-STEERING WHEELSETS

South African Railways has developed a railway vehicle suspension capable of reducing wheel flange and rail wear and of improving the lateral stability of the vehicles. This cross-anchor suspension uses wheelsets with treads having higher-than-standard conicity which are held in the truck frame by means of rubber pads of low longitudinal and lateral shear stiffness. Wheel wear after extensive service has been as low as expected. Some of the problems which occurred and were overcome as loads were raised from 20 to 26 tons per axle are described.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Scheffel, H
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 311 Pap E.2, 1978, pp 1-11, 17 Fig., 1 Tab., 7 Ref., 1 App.

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

DOTL RP

03 303705
DEVELOPMENT OF TAPERED ROLLER BEARINGS FOR HIGH SPEED AND HEAVY HAUL RAILWAY SERVICE

Tapered roller bearings have been proven to provide reliable performance in railway service where other types of bearings have not performed satisfactorily. Tapered roller bearings can take combinations of heavy radial and thrust loads and thus are suited to high speed and heavy haul railway service. A premium bearing developed for heavy haul service does not require disassembly for inspection when removed from the axle, unless at the time of shopping the wheel set, the bearings have exceeded 966,000 kilometres or ten years of service. A spin-off from this, the no-field-lubrication or NFL bearing concept provides a bearing that is not relubricated in the field.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Fairhurst, JE Crawford, GN (Australian Timken Proprietary Limited)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 402 Pap F.2, 1978, pp 1-6, 11 Fig., 5 Tab., 4 Ref.

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

DOTL RP

03 303708
THE DEVELOPMENT OF AN ORE CAR

The ore car used by Hamersley's railroad was adapted from a Southern Pacific design originally. Subsequent orders have involved several developmental and modification stages over 12 years. The paper traces the problems, either inherent in the original design or those that resulted from Australian operation, and tells how they have been overcome. Two experimental aluminum cars have had 2 years of service and have operated with their steel counterparts successfully, saving 3 tons in tare at a time when energy costs are increasing.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Smith, L (Westinghouse Brake & Signal Co Pty Ltd, Australia); Ferrier, J (Tomlinson Steel Pty Ltd, Australia); Camus, R (Comalco Limited, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 406 Pap F.4, 1978, pp 1-7, 10 Fig.

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

DOTL RP

03 303726
THE COMPUTERISED MONITORING OF RAILWAY WHEELS IN MOTION

Of increasing concern to operators of heavy haul railways is the incidence of locomotive and car wheel failures due primarily to thermal stressing and thermal cracking. Subsequent derailments represent dangerous and costly interruptions to freight movement. An automated wheel inspection system capable of monitoring a moving train would appear to be a worthwhile investment. In this paper the conceptual outline of such a system is given along with its potential mode of operation.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Kemeny, LG (New South Wales University, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Paper X.4, 1978, pp 1-10, 3 Fig., 1 Tab., 10 Ref., 4 App.

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

DOTL RP

03 303850
NATIONAL CONTAINER TESTING CENTRE AT TERGNIER

The develpoment of containers, and particularly of transcontainers and ISO containers listed in UIC Leaflet 592-1, has been the justification for installing equipment for carrying out the quality control on reception of these loading units or at least the first of a series. The national testing centre has been built in the Tergnier Rolling Stock Workshop and is designed for completing a full test per working day and can deal with all containers or swap bodies built or registered in France. The extensive facilities it has available and the speed at which it can produce its conclusions, mean that the centre is often called upon to carry out numerous approval tests on prototypes at international level. [French]

Desmis, J Querci, Y *Revue Generale des Chemins de Fer* Vol. 98 July 1979, pp 375-383

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

03 303853
DESIGN AND MANUFACTURE OF THE BRITISH RAIL HIGH SPEED TRAIN CAB

Discusses in detail the development of the cab portion of the High Speed Train, especially the use made of GRP and sandwich structures.

Gotch, TM *Plastics and Rubber International* Vol. 4 No. 3, May 1979, n.p.

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

03 303866
AMTRAK'S NEW SUPERLINERS: A TOUCH OF CLASS IN THE WEST

The 285 bilevel cars for long-haul western services, including the first new sleeping cars built in the U.S. in over 20 years, are described. Amtrak will reequip all its Chicago-West Coast services as well as the Coast Starlight, Sunset Limited, Panama Limited and Inter-American with various combinations of the five car configurations which are being turned out.

Armstrong, JH *Railway Age* Vol. 180 No. 23, Dec. 1979, pp 36-39, 4 Phot.

ORDER FROM: ESL

DOTL JC

03 303979
RAILWAY MECHANICAL ENGINEERING. CAR AND LOCOMOTIVE DESIGN. A CENTURY OF PROGRESS

The centennial of organization of the American Society of Mechanical Engineers is marked by this publication of the History and Technology

Committee of ASME's Rail Transportation Division. While many of railroading's innovations were of British or European origin, North American engineers adapted them to rolling stock and train handling techniques for movement of the longest and heaviest trains in the world. North American developments essential for high-capacity, interchange railroading include the automatic air brake, automatic coupler, friction draft gear and track circuit. In a series of articles the evolution and status of the following are described: Train braking, steam locomotive, diesel-electric locomotive, electric locomotive, remote multiple-unit locomotive control, Canadian rolling stock, U.S. freight cars, passenger cars, passenger-car trucks, temperature control, wrought-steel and cast-steel wheels, plain and rolling journal bearings, hand brakes, freight-car trucks, couplers, draft gears, cast-metal and composition brake shoes, rapid-transit car trucks and propulsion.

American Society of Mechanical Engineers 1979, 445 p., Figs.

ORDER FROM: ESL

03 304662
IMPROVED PASSENGER EQUIPMENT EVALUATION PROGRAM. TECHNOLOGY REVIEW: WHEELS, AXLES, COUPLERS

The status of two foreign rail technologies is analyzed in this report. The two technologies are Wheels and Automatic Couplers. The wheel development program for the French TGV is reviewed. It illustrates the application of classical wheel design to modern high-speed rail transport. The resilient wheel and its reduction of effective unsprung mass is studied; the SAB resilient wheel application on British Rail is reviewed. Lightweight axles are also discussed. The review of automatic coupler technology is primarily concerned with the latest coupler designs from both the mechanical and electrical train-line concepts. The evolution and development of advanced couplers in the United States and Europe are covered.

Prepared in cooperation with Small Business Administration, Washington, DC.

Bellovin, M DeVilliers, AL Dow, AL
Unified Industries, Incorporated, Federal Railroad Administration FRA-/ORD-79/45, Mar. 1978, 65 p.

Contract DOT-FR-717-4249

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300775/4ST, DOTL NTIS

03 304696
SLRV (STANDARD LIGHT RAIL VEHICLE) ENGINEERING TESTS AT DEPARTMENT OF TRANSPORTATION, TRANSPORTATION TEST CENTER. FINAL TEST REPORT

No abstract available.

Set includes PB-301146 thru PB-301149, Volume I thru Volume IV as RRIS 03 304697 thru RRIS 03 304700 respectively; Bulletin 8001.

Boeing Vertol Company, Transportation Systems Center, Urban Mass Transportation Administration Feb. 1979, 385 p., 4 Volumes

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-301145-SET/ST, DOTL NTIS

03 304697
SLRV (STANDARD LIGHT RAIL VEHICLE) ENGINEERING TESTS AT DEPARTMENT OF TRANSPORTATION, TRANSPORTATION TEST CENTER. FINAL TEST REPORT. VOLUME I-INTRODUCTION

The Standard Light Rail Vehicle (SLRV) is a 71-foot vehicle, articulated to negotiate curves down to 32-foot radius and designed to operate at speeds up to 50 mph. Although the basic configuration and performance is standardized, the current operating properties (Massachusetts Bay Transportation Authority and San Francisco Municipal Railway) have specified individual requirements for auxiliary equipment and passenger accommodation. Engineering testing on the SLRV was conducted by the Boeing Vertol Company at the Transportation Test Center in Pueblo, Colorado in accordance with the General Vehicle Test Plans (GSP-064), which are designed to provide the data necessary for quantitative comparison of different transit cars. This report presents the results of the series of tests conducted. The general objective of the test program was to establish a data baseline for the SLRV obtained in accordance with the General Vehicle Test Plans and to provide further experience in the use of the Test Plans in testing urban rail vehicles. Volume I contains a description of the SLRV Test Program and the vehicle, and a summary of the test results.

See also RRIS 03 304696; Bulletin 8001. Also available in set of 4 reports PC E10, PB-301 145-SET.

Boeing Vertol Company, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA792-7VOL1, UMTA-MA-06-0025-79-3, Feb. 1979, 74 p.

Contract DOT-TSC-1062

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-301146/7ST, DOTL NTIS

03 304698
SLRV (STANDARD LIGHT RAIL VEHICLE) ENGINEERING TESTS AT DEPARTMENT OF TRANSPORTATION, TRANSPORTATION TEST CENTER. FINAL TEST REPORT. VOLUME II-PERFORMANCE AND POWER CONSUMPTION TESTS

The SLRV (Standard Light Rail Vehicle) is a 71-foot vehicle, articulated to negotiate curves down to 32-foot radius and designed to operate at speeds up to 50 mph. Although the basic configuration and performance is standardized, the current operating properties (Massachusetts Bay Transportation Authority and San Francisco Municipal Railway) have specified individual requirements for auxiliary equipment and passenger accommodation. This report presents the results of the series of tests conducted. The general objective of the test program was to establish a baseline for the SLRV obtained in accordance with the General Vehicle Test Plans and to provide further experience in the use of the Test Plans in testing urban rail vehicles. Volume II contains detailed descriptions and discussions of the engineering tests performed on samples of the SLRV.

See also RRIS 03 304696; Bulletin 8001. Also available in set of 4 reports PC E10, PB-301 145-SET.

Boeing Vertol Company, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA792-7VOL2, UMTA-MA-06-0025-79-4, Feb. 1979, 66 p.

Contract DOT-TSC-1062

ACKNOWLEDGMENT: NTIS
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PB-301147/5ST, DOTL NTIS

03 304699
SLRV (STANDARD LIGHT RAIL VEHICLE) ENGINEERING TESTS AT DEPARTMENT OF TRANSPORTATION, TRANSPORTATION TEST CENTER. FINAL TEST REPORT. VOLUME III-RIDE QUALITY, NOISE, AND RADIO FREQUENCY INTERFERENCE TESTS

The SLRV (Standard Light Rail Vehicle) is a 71-foot vehicle, articulated to negotiate curves down to a 32-foot radius and designed to operate at speeds up to 50 mph. Although the basic configuration and performance is standardized, the current operating properties (Massachusetts Bay Transportation Authority and San Francisco Municipal Railway) have specified individual requirements for auxiliary equipment and passenger accommodation. This report presents the results of the series of tests conducted. The general objective of the test program was to establish a baseline for the SLRV obtained in accordance with the General Vehicle Test Plans and to provide further experience in the use of the Test Plans in testing urban rail vehicles. Volume III contains detailed descriptions and discussions of the engineering tests performed on samples of the SLRV.

See also RRIS 03 304696; Bulletin 8001. Also available in set of 4 reports PC E10, PB-301 145-SET.

Boeing Vertol Company, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA792-7VOL3, UMTA-MA-060025-79-5, Feb. 1979, 178 p.

Contract DOT-TSC-1062

ACKNOWLEDGMENT: NTIS
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PB-301148/3ST, DOTL NTIS

03 304700
SLRV (STANDARD LIGHT RAIL VEHICLE) ENGINEERING TESTS AT DEPARTMENT OF TRANSPORTATION, TRANSPORTATION TEST CENTER. FINAL TEST REPORT. VOLUME IV-DATA LOGS
The SLRV (Standard Light Rail Veicle) is a 71-foot vehicle, articulated to negotiate curves down to a 32-foot radius and designed to operate at speeds up to 50 mph. Although the basic configuration and performance is standardized, the current operating properties (Massachusetts Bay Transportation Authority and San Francisco Municipal Railway) have specified individual requirements for auxiliary equipment and passenger accommodation. This report presents the results of the series of tests conducted. The general objective of the test program was to establish a baseline for the SLRV obtained in accordance with the General Vehicle Test Plans and to provide further experience in the use of the Test Plans in testing urban rail vehicles. The test program was divided into five categories: performance; power consumption; ride roughness; noise; and radio frequency interference.
See also RRIS 03 304696; Bulletin 8001. Also available in set of 4 reports PC E10, PB-301 145-SET.

Boeing Vertol Company, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMTA792-7VOL4, UMTA-MA-06-0025-79-6, Feb. 1979, 67 p.

Contract DOT-TSC-1062

ACKNOWLEDGMENT: NTIS
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PB-301149/1ST, DOTL NTIS

03 307658
DEVELOPMENT OF CROSS-BRACED FREIGHT BOGIES
There is currently world wide interest in cross-braced, cross-anchored and radial trucks. These are all terms which describe trucks having wheelsets connected together in such a way as to increase the shear stiffness between them while leaving the wheelsets reasonably free to adopt a radial position when negotiating a curve. The impetus for the development of these trucks has come from the increasing demands of railways for higher operating speeds combined with good wheel-life, even when the route involves sharply curved sections. The cross-braced truck concept provides greater scope to the designer over the difficult compromise between stability and curving. This article describes theoretical studies which have been carried out to examine the potential of this type of truck and the experimental results obtained from track tests of a pair of development trucks.

Pollard, MG (British Railways Board) *Rail International* No. 9, Sept. 1979, pp 736-758, 18 Fig., 1 Tab., 1 App.

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03 307685
NEW DEVELOPMENT CONCERNING CONTAINERS USED BY THE DB IN INTERNAL TRAFFIC [Neue Entwicklungen auf dem Gebiet der DB-Binnencontainer]
Description of a number of containers developed for DB internal traffic. [German]

Gerke, H *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 553-557, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

DOTL JC

03 307691
THE SECOND GENERATION OF THE SHINKANSEN TRAIN HAS MADE ITS DEBUT
A prototype electric train, called Type 962, has been constructed, and is now undergoing operating trials on the experimental line in Oyama Region. A description is given of the new train which will be put into service on the Joetsu and Tohoka Shinkansen lines.

Shima, T *Japanese Railway Engineering* Vol. 19 No. 1, 1979, pp 19-23, 3 Phot.

ACKNOWLEDGMENT: Japanese Railway Engineering
ORDER FROM: ESL

DOTL JC

03 308258
EFFECTS OF RAIL VEHICLE SIZE: A SPECIAL BIBLIOGRAPHY
This document contains abstracts of documents related to the size, weight, or length of rail vehicles. These abstracts are drawn from the magnetic tape files of the Railroad Research Information Service (RRIS). These files are comprised of abstracts of technical reports, journal articles, and other materials from domestic and foreign sources.

Transportation Research Board, Federal Railroad Administration FRA-/ORD-79/49, Nov. 1979, 52 p.

ORDER FROM: NTIS

PB80-122955, DOTL NTIS, DOTL RP

03 308261
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES FOR CRASHWORTHINESS
This document reviews three phases of study conducted to evaluate and improve the crashworthiness of passenger carrying vehicles in intercity service. Phase I surveyed the accident data over a period 1966 to 1973 and identified those areas responsible for the majority of accidents involving human injury (both operating personnel and fare-paying passengers). An analysis was also conducted on the structural integrity of a commuter car-identified as the single largest source of injuries in the subject time frame. Phase II extended the structural survey to the caboose and the locomotive cab and included both static and dynamic analyses of the crash scenarios. The design is predicated about the provision of a "Survivable Volume."

Widmayer, E
Boeing Vertol Company, Federal Railroad Administration Final Rpt. FRA/ORD-79-13, DOT-TSC-FRA-79-13, Sept. 1979, 130 p., Figs., Tabs., 1 App.

Contract DOT-TSC-856

ORDER FROM: NTIS

DOTL NTIS, DOTL RP

03 308264
THEORETICAL MANUAL AND USERS' GUIDE FOR COMET-X
COMET-X is the experimental prototype of an advanced finite element software system. The distinguishing feature of COMET-X is that the user controls the order of polynomial approximation over each finite element, as well as the number and distribution of finite elements. This provides for very efficient and accurate approximation procedures. The present capabilities of COMET-X include the following: linear elastic analysis of plates under plane stress (or strain) and flexure. The plate may be isotropic or orthotropic (simple or multi-layer). In the case of plane stress or strain problems, the plate may be stiffened by prismatic or tapered members. For example, the program was used to carry out detailed stress analysis for a box car body bolster. In addition, COMET-X is well-suited for the computation of stress intensity factors in linear elastic fracture mechanics. In all of the computational tests conducted so far, COMET-X has been found to be superior in accuracy and efficiency to existing finite element software systems.
This project constitutes Subtask 4.0 of Task IX of the TTD Program (Phase-II).

Basu, PK Rossow, MP Szabo, BA
Washington University, St Louis, Federal Railroad Administration Tech Rpt. AAR R-340, Aug. 1977, 124 p., Figs., 19 Ref., 5 App.

Contract DOT-FR-64228

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

DOTL RP

03 308265
COMPUTER AIDED DESIGN--VOLUME I COMET-X-DEMONSTRATIVE EXAMPLES
The report contains an overview of COMET-X, a degree adaptive finite element program. Specific applications of COMET-X to railroad oriented and stress concentration problems are sought and described. The accuracy of results and efficiency of computation is compared with GIFTS-4, a grid adaptive finite element program. It is observed that in general COMET-X requires less CPU time than GIFTS-4. Little or no effort has been devoted to presenting the advantages of graphic pre-and post-processing of GIFTS Program.

Prasad, B Garg, VK
Association of American Railroads Technical Center Tech Rpt. AAR R-358, Feb. 1979, 68 p., Figs., Tabs., 14 Ref., Apps.

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

DOTL RP

03 308278
TRUCK DESIGN OPTIMIZATION PROJECT PHASE II. FRICTION SNUBBER FORCE MEASUREMENT SYSTEM (FSFMS) FIELD TEST REPORT

This report documents the results of the Friction Snubber Force Measurement System (FSFMS) special road test program that was performed during TDOP Phase II. The FSFMS was designed, built, and shop-tested during TDOP Phase I (see FRA/ORD-78/69). Descriptions of the test equipment, procedures, methods of data analysis, results, and recommendations are contained in this report. The test program was successfully completed using friction snubber transducers to obtain friction forces in over-the-road truck tests. The primary purpose of the tests was to obtain estimates of the friction coefficients associated with ASF Ride Control and Barber S-2 70-ton trucks. The report provides some preliminary analyses using the test data and recommends areas where additional information may be extracted.

This test report is supplemented by the FSFMS Test Data Tapes, FRA/ORD/MT-79/24 and the Measurement of Friction Snubber Forces in Freight Car Trucks, Final Report, FRA/ORD-78/69, dated December 1978.

Gibson, DW
Wyle Laboratories, Federal Railroad Administration Test Rpt. FRA-/ORD-79/24, TDOP Tech Rpt. TR-08, Oct. 1979, 61 p., Figs., Tabs., 4 Ref., 4 App.

Contract DOT-FR-742-4277

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DOTL NTIS, DOTL RP

03 308289
THE COURSE OF DEVELOPMENT OF SHINKANSEN. CARS AND FUTURE PLANNING

The rolling stock fleet at present in service on the Shinkansen between Tokyo and Hataka totals 2,336 cars. The first prototype vehicles were tested in 1962 on the Kamonomiya test track. The article describes the various designs of the cars and inspection methods. In the case of the Tohoku and Joetsu lines, the Shinkansen will run through regions with much heavier snowfalls. New rolling stock has therefore been designed to resist temperatures of minus 15 deg C and snowy conditions, making use of experience acquired during construction of the Tokaido line.

Ishi, Y *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 11-15, 1 Fig., 1 Tab., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

03 308295
MICROCLIMATE IN THE DRIVER'S CAB OF THE CS2T V OSENNE-ZIMNIJ PERIOD [Mikroklimat v kabine masinista elektrovoza CSET v osenne-zimnij period]

No Abstract. [Russian]

Bobrovnikov, NA Dmitriev, OM *Zheleznodorzhnyi Transport. Series: Ohrana Truda* No. 2, 1979, pp 12-17, 2 Fig., 2 Tab.

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

03 308440
REQUIREMENTS FOR CLOSED VAN CARGO CONTAINERS

Closed van cargo containers are employed for the transport of cargo in large unit loads. The requirements contained in this standard define containers which will achieve maximum efficiency and overall economy in the interchange between modes and in the transport of containerized cargo.

ANSI Standard No. MH5.1.1M, 1979, 48 p.

ACKNOWLEDGMENT: EI
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03 308442
MORE COMFORT EVEN IN NARROW-GAGE RAILROAD CARS [Mehr Komfort auch in Meterspur-Eisenbahnwagen]

The article describes a new type of narrow-gage car for a private Swiss railroad company, in which the advantages of aluminum extrusions are fully exploited. Anticorodal-080 (AlMgSi0.8) and Extrudal-050 (AlMgSi0.5) are used for the extrusions, and Peraluman-260 (AlMg2.5Mn) for the narrow sheeting still required on the sidewalls near the windows. Experience with the new vehicle in terms of running properties, noise level, and economy has been positive. [German]

Also published in French.

Skvor, F *Schweizer Alumin Rundschau/Revue Suisse de Alumin* Vol. 29 No. 3, 1979, pp 91-95

ACKNOWLEDGMENT: EI
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03 308446
APPLICATIONS OF STRUCTURAL INTEGRITY TECHNOLOGY IN THE RAILROAD INDUSTRY

The railroad industry provides examples of the recent application of advanced principles of structural integrity technology under conditions of severe constraints due to economic factors. Conventional metals and product forms, readily available from commercial sources, must be utilized to achieve practical solutions. Three case examples were selected to illustrate entirely different objectives for structural integrity technology applications. These are (1) the fracture safe specification of AAR cast steels; (2) selection of steels for tank cars involving shipment of hazardous materials; and (3) reliability criteria for fatigue specifications based on S-N design.

Structural Integrity Technology, paper presented at a Conference, Washington, D.C., May 9-11, 1979.

Pellini, WS Stone, DH Harris, WJ, Jr
American Society of Mechanical Engineers Conf Paper 1979, pp 125-143, 12 Ref.

ACKNOWLEDGMENT: EI
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04 197883
EVALUATION OF A FLYWHEEL-POWERED SHUTTLE CAR. FINAL TECHNICAL REPORT AS OF AUGUST 25, 1978
The objectives of this contract were to study and evaluate the practical application of flywheel-stored energy devices to shuttle cars in underground coal mining and to study and evaluate the most practical methods of charging, recovery, and transmitting flywheel energy so as to provide power for the necessary functions of a shuttle car. The general conclusions of the study indicate that the mine mission requirements can be fulfilled with a flywheel energy storage system which can be designed within the present state-of-the-art, that a flywheel system can yield sufficient economic benefits to warrant a mine demonstration, and that there is promise of safety improvements due to elimination of the trailing cable presently used. In addition, the study indicates that specific operation problems associated with a flywheel-powered vehicle, like emergency movement of the vehicle and transmission of energy from the wayside to the vehicle, can be satisfactorily solved. Specific studies leading to the above conclusions have been conducted, and a baseline flywheel energy storage system recommended. (ERA citation 04:023321)

Boucheron, PH Cain, DE Rubenstein, AS
General Electric Company, Department of Energy Aug. 1978, 335 p.

Contract ET-77-C-01-8890

ACKNOWLEDGMENT: NTIS
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FE-8890

04 198745
THE STATUS OF ADVANCED PROPULSION SYSTEMS FOR URBAN RAIL VEHICLES
Rheostatic control of dc traction motors has been in use for several decades. With the advent of power electronics, however, more efficient alternate propulsion systems have been developed. These include chopper controls, ac drive with induction motors, systems using onboard energy storage and ac drive with tubular axle motors. Of these concepts, chopper controllers have been in regular revenue service for several years while others are still under prototype testing. This report is a technology review of advanced traction systems. It is based on information and data gathered from propulsion equipment suppliers in Europe, Japan, and the United States. The report describes in detail the status of all these propulsion systems. The performance characteristics, the significant advantages and disadvantages and the deployment of the hardware in revenue service for all these systems is discussed. The report concludes with a general description of alternate traction motors and power converters.

Nene, VD
Mitre Corporation, Urban Mass Transportation Administration Final Rpt. MTR-79W0022, UMTA-VA-06-0053-79-1, May 1979, 227 p.

Contract DOT-UT-9002

ACKNOWLEDGMENT: NTIS
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PB-297980/5ST

04 199049
SELF-SYNCHRONOUS PROPULSION SYSTEM FOR RAPID TRANSIT RAILCARS-ADVANCED SUBSYSTEM DEVELOPMENT PROGRAM
No abstract available.

Set includes PB-298770 thru PB-298772, RRIS 04 199050 thru 199052 respectively; Bulletin 8001.

General Motors Corporation, Boeing Vertol Company, Urban Mass Transportation Administration Feb. 1978, 632 p., 3 volumes

ACKNOWLEDGMENT: NTIS
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PB-298769-SET/ST

04 199050
SELF-SYNCHRONOUS PROPULSION SYSTEM FOR RAPID TRANSIT RAILCARS-ADVANCED SUBSYSTEM DEVELOPMENT PROGRAM. VOLUME I: PROGRAM SYNOPSIS
The objective of the overall Advanced Subsystem Development Program (ASDP) was to develop advanced subsystems suitable for application in existing or future transit cars. This report, Volume I, summarizes the content of Volume II, and follows essentially the same outline. Volume II discusses the program technical effort, program scope, objectives, and background; summarizes the design and testing efforts and problem areas; contains conclusions and recommendations; discusses system functional characteristics, train performance characteristics, major component design, interfaces, and product assurance; covers developmental, major component and system level testing; contains a description of the changes made during system testing; discusses the status of the final configuration; and addresses unresolved problems.

See also RRIS 04 199049; Bulletin 8001. Also available in set of 3 reports PC E12, PB-298 769-SET.

General Motors Corporation, Boeing Vertol Company, Urban Mass Transportation Administration, (UMTA-IT-06-0026) Final Rpt. R78-14-VOL-1, UMTA-IT-06-0026-79-1, Feb. 1978, 82 p.

ACKNOWLEDGMENT: NTIS
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PB-298770/9ST

04 199051
SELF-SYNCHRONOUS PROPULSION SYSTEM FOR RAPID TRANSIT RAILCARS-ADVANCED SUBSYSTEM DEVELOPMENT PROGRAM. VOLUME II: DETAILED TECHNICAL DISCUSSION
Development of the Self-Synchronous Propulsion System was conducted under the Advanced Subsystem Development Program (ASDP), which is a part of the Urban Rapid Rail Vehicle and Systems (URRV&S) Program sponsored by the Urban Mass Transportation Administration. The Self-Synchronous Propulsion System was one of the advanced subsystems that had been identified during the Advanced Concept Train (ACT) proposal evaluation as showing outstanding merit, and was planned to be developed for evaluation by the Transit Authorities. The objective of the overall ASDP was to develop advanced subsystems suitable for application in existing or future transit cars. This report, Volume II, discusses the program technical effort, program scope, objectives, and background; summarizes the design and testing efforts and problem areas; contains conclusions and recommendations; discusses system functional characteristics, train performance characteristics, major component design, interfaces, and product assurance; covers developmental, major component and system level testing; contains a description of the changes made during system testing; discusses the status of the final configuration; and addresses unresolved problems.

See also RRIS 04 199049; Bulletin 8001. Also available in set of 3 reports PC E12, PB-298 769-SET.

General Motors Corporation, Boeing Vertol Company, Urban Mass Transportation Administration, (UMTA-IT-0026) Final Rpt. R78-14-VOL-2, UMTA-IT-06-0026-79-2, Feb. 1978, 421 p.

ACKNOWLEDGMENT: NTIS
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PB-298771/7ST

04 199052
SELF-SYNCHRONOUS PROPULSION SYSTEM FOR RAPID TRANSIT RAILCARS-ADVANCED SUBSYSTEM DEVELOPMENT PROGRAM. VOLUME III: APPENDIXES
The objective of the overall Advanced Subsystem Development Program (ASDP) was to develop advanced subsystems suitable for application in existing or future transit cars. This report, Volume III, contains appendix material which was considered either too bulky or too detailed to incorporate into Volume II. Appendixes A through G in Volume III are: Train Control Electronics (TCE) Flow Diagrams; Train Performance Analysis Computer Program; List of Drawings and Specifications; Diagnostics Unit RAM Memory Code Identification; Diagnostics Unit Subroutine Flow Diagrams; Motor Power Supply System, U.S. Patent No. 3,866,094; and Mapham Inverter and Analytic Model Description, respectively.

See also RRIS 04 199049; Bulletin 8001. cooperation with Boeing Vertol Co., Philadelphia, PA. Also available in set of 3 reports PC E12, PB-298 769-SET.

General Motors Corporation, Boeing Vertol Company, Urban Mass Transportation Administration, (UMTA-IT-0026) Final Rpt. R78-14-VOL-3, UMTA-06-0026-79-3, Feb. 1978, 129 p.

ACKNOWLEDGMENT: NTIS
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04 300576
FLUID BED COMBUSTION COAL FIRED STEAM LOCOMOTIVE
Railways are the one form of transport that can run as well on coal and bunkering fuel as on any other fuel. The paper outlines the basic requirements and constraints of any future design of coal burning locomotive and discusses the merits and problems associated with the use of fluidized combustion. Consideration is given to a proposed Rankine cycle for a freight locomotive highlighting some control problems associated with the complex dynamically interacting thermodynamic components.

International Conference on Future Energy Concepts, London, England, January 30-February 1, 1979.

Sharpe, JE (London University, England)
Institution of Electrical Engineers IEE Conf Publ n171, 1979, pp 325-329, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

04 300577
HUNDREDTH EMU OF SERIES 420 WITH ELECTRICAL EQUIPMENT BY AEG-TELEFUNKEN
In the system of the German Federal Railway (DB) there are at present 260 EMU's of series 420 in operation. A further 110 trains are now under construction or on order. AEG-TELEFUNKEN is supplying and installing the entire electrical equipment for 138 EMU's. On the 3rd of May, 1978 the EMU No. 420 263 was officially handed over to the DB as the 100th train supplied by AEG-TELEFUNKEN. As a result of this event, the development steps, the previous supplies and the part played therein by AEG-TELEFUNKEN are described.

Falk, P *AEG[Telefunken Progress* No. 4, 1978, pp 123-125

ACKNOWLEDGMENT: EI
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04 300602
CONTROLLING ELECTRIC TRACTION DRIVES FOR MINIMUM ENERGY WASTAGE
The inclusion of a gradient load, as a fixed but arbitrary function of distance travelled, is investigated within the design of an optimal controller for electric traction drive.

Edwards, JB Eren, H *Institution of Electrical Engineers, Proceedings* Vol. 126 No. 3, Mar. 1979, pp 254-260, 13 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
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04 300626
REGULARITIES IN WEAR-OUT OF COMMUTATORS AND BRUSHES OF ELECTRIC LOCOMOTIVE TRACTION MOTORS [Zakonomernosti iznosa kollektorov i shchetok tyagovykh dvigatelei elektrovozov]
Expressions for wear prediction are suggested based on complex investigations of commutator and brush wear in traction motors of electric locomotives. Properties of sliding contacts and motor characteristics are taken into account. The expressions may be used for both maintenance and motor design. [Russian]

Shcherbakov, VG *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 12, Dec. 1978, p 1293, 9 Ref.

ACKNOWLEDGMENT: EI
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04 300737
SINGLE-STEP AC MOTOR/INVERTER SYSTEM FOR RAPID TRANSIT VEHICLES
The paper describes the problems connected with a single-step inverter system for three-phase ac drives of tramcar units. The inverter is directly connected to the contact line and controls both the output frequency and the voltage. The most essential components of the drive are described: basic circuit configuration, traction motor, control scheme and circuit diagram of inverter. The drive operates without any contacts. The motor is controlled for the optimum rotor frequency and well utilised. Reducing the number of components, space requirements and weight of the inverter presents the main problem in the further development of the drive system. [German]

Kamenicky, J *Glasers Annalen ZEV* Vol. 102 No. 2-3, Feb. 1979, pp 77-82

ACKNOWLEDGMENT: British Railways
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04 301139
THE STIRLING ENGINE: POWER PLANT OF THE FUTURE?
Over one hundred and sixty years after Robert Stirling invented the engine that now bears his name, the Stirling engine seems to be the ideal power plant to meet the legislative and economic pressures of the 1980s. Quiet, pollution-free and theoretically efficient, the Stirling engine seems poised to make a come-back.

See also Part 1, Vol. 26 No. 4, April 1979 issue, pp 60-63.

Holland, MB *Chartered Mechanical Engineer* Vol. 26 No. 5, May 1979, pp 60-62

ACKNOWLEDGMENT: British Railways
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04 301157
THREE-PHASE ASYNCHRONOUS TRACTION MOTORS FOR ELECTRIC TRACTIVE UNITS [Drehstrom-Asynchronfahrmotoren fuer elektrische Triebfahrzeuge]
No Abstract. [German]

Moritz, W-D Roehlk, J *Elektrische Bahnen* Vol. 50 No. 3, Mar. 1979, pp 65-71, 2 Tab., 12 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 301159
THE ASYNCHRONOUS MOTOR ELECTRIC LOCOMOTIVE [Elektrovoz s asinkronnymi dvigateljami]
Requirements for designing a new electric locomotive. Technical data for the VL80A-751 type electric locomotive with asynchronous motors and 8 axles, with its main electric wiring diagram. Results of tests conducted on the Moscow and North Caucasian networks. [Russian]

Avatkov, ES *Elektricheskaya i Teplovoznaia Tiaga* Vol. 5 No. 269, May 1979, pp 40-42, 4 Fig., 1 Tab.

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

04 301169
STATE OF PROGRESS, EXTENSION CRITERIA AND SERVICE TESTS ON COMMUTATOR TRACTION MOTORS [Stand der Entwicklung, Auslegungskriterien und Bewaehrung von Kommutatorfahrmotoren fuer elektrische Triebfahrzeuge]
No Abstract. [German]

See also Vol. 50 No. 3 March 1979 issue, pp 78-82.

Kuhlow, J *Elektrische Bahnen* Vol. 50 No. 2, Feb. 1979, pp 30-40, 32 Phot., 52 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 301182
DEVELOPMENT OF CONTINUOUS CONTROL CONVERTERS FOR ALTERNATING CURRENT TRACTIVE UNITS [Entwicklung der stufenlos steuerbaren Netzstromrichter fuer Wechselstromtriebfahrzeuge]
No Abstract. [German]

Mueller-Hellmann, A *Elektrische Bahnen* Vol. 50 No. 3, Mar. 1979, pp 72-77, 10 Phot., 37 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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04 301195
POSSIBILITIES OF AUTOMATIC CONTROL SYSTEMS INCORPORATED IN ELECTRIC TRACTION EQUIPMENT, THEIR COMMAND SEQUENCE AND EXAMPLES OF SIGNAL TRANSMISSION USING LIGHT GUIDES [Moeglichkeiten der Automatik in Elektrischen Traktionsausruestungen, ihr Befehlsablauf und Anwendungsbeispiele der Befehlsuebertragung Mittels Lichtleiter]
Following an outline of the developments in the control of electric motor vehicles, especially for local transport, an automatic traction control equipment is described. The important signals to be processed, such as current setting, load compensation, slip-slide protection and power control of series and induction traction motors are discussed. The principal features of a signal transmission system using light guides are mentioned and described by means of examples. [German]

Eckermann, G *Glasers Annalen ZEV* Vol. 103 No. 2-3, Feb. 1979, pp 114-124

ACKNOWLEDGMENT: EI
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04 301201
PROTECTING STREETCAR ELECTRIC EQUIPMENT AGAINST OVERVOLTAGES
In recent years the Kalinin Leningrad Polytechnical Institute (LPI) has investigated internal overvoltages for the electric equipment of electric rolling stock. Some results of this research obtained for the type LM-57 car are given. The measurements were carried out by means of an automatic internal-overvoltage recorder. It is shown that overvoltages with amplitudes 2.1 KV (more than the operating test voltage) may be expected to occur more than 60 times a year in the power circuit of a streetcar protected by conventional type RMVU-0.55 arrestors; thus, nonlinear-resistance arrestors with improved characteristics must be developed and placed into service.

Alekseev, SA Khalilov, FK Shilina, NA *Soviet Electrical Engineering* Vol. 49 No. 3, 1978, pp 104-107

ACKNOWLEDGMENT: EI
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04 301203
ELECTRIC-ELECTRONICS SYSTEM FOR THE CONTROL OF LOCOMOTIVES USED FOR UNDERGROUND TRANSPORTATION [Energoelektroniczny uklad Sterowania Lokomotyw do Przewozu Podziemnego]
Problems of pulse supply and control of mining locomotive drives are discussed, along with electromagnetic effects. A system of local and remote control of a train with two locomotives is considered. [Polish]

Szczucki, F *Przeglad Elektrotechniczny* Vol. 54 No. 11, Nov. 1978, pp 470-474, 5 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 301323
TECHNOLOGY AND ECONOMICS OF REGENERATION FOR LIGHT-RAIL APPLICATIONS
Regeneration is one method of recycling a vehicle's surplus kinetic energy during braking. Regeneration is recuperative braking in which the recycled energy goes back to the vehicles' power supply system for use by other vehicles. Several propulsion systems that use regenerative braking have been applied and operated on direct-current electrified rail systems. The fundamental limitations on effectiveness that are beyond the propulsion designer's control are considered. The performance of an alternating-current induction motor system with an inverter and a direct-current series motor system with a chopper are explored to illustrate the present state of technology. Comparison is made with two other types of recuperative braking--flywheel energy storage and height changes in the route profile. The inefficiency of the former and the difficulty of construction of the latter are noted. The industry's present interest in regeneration is questioned since it would have minimal economic impact but require complex propulsion hardware and extra maintenance costs. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Vutz, N (Klauder (Louis T) and Associates) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 149-160, 15 Fig., 4 Ref.

ORDER FROM: TRB Publications Off

04 301416
USE OF CHOPPERS FOR REGULATING THE RENFE D.C. ELECTRIC MOTIVE POWER UNITS [Aplicacion de chopper a la regulacion de los motores de traccion electrica de corriente continua en "RENFE"]
Presentation of the RENFE research program covering the use of choppers for regulating and controlling electric motive power units; this programme provides for the study of the various RENFE track circuits, of harmonics caused by the sub-stations, as well as of the results of tests and measurements carried out with two prototype chopper motors in order to determine whether their operation causes interference in track circuits and during communication transmission. The article describes the initial results of these investigations. [Spanish]

Martin, MH *AIT-Revista* No. 27, Mar. 1979, pp 23-38, 1 Tab., 30 Phot., 30 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

04 301417
PULSE-CONTROLLED CURRENT CONVERTERS FOR FREQUENCY CONVERTERS WITH INTERMEDIATE CURRENT [Pulsgesteuerte Einspeisestromrichter fuer Umrichter mit eingepraegtem Zwischenkreisstrom]
Single phase pulse converters on the railways need to be placed so as not to cause interference with railway operations. The article describes the structure and working principles of a pulse-controlled converter made up of a rectifier, intermediate circuit and filter condenser, and a chopper for distributing variable d.c. voltages. [German]

Becker, W *Elektrotechnische Zeitschrift, Ausgabe A* Vol. 100 No. 9, Apr. 1979, pp 434-436, 12 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: VDE-Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12, West Germany

04 301436
DB STARTS TESTS WITH CLASS 120 THREE-PHASE LOCOS
The first of five Class 120 prototypes has been delivered for testing to German Federal Railway. This dual-service locomotive, rated at 5,600 kW, collects single-phase ac which is converted by a four-quadrant controller and inverter into variable-frequency, three-phase supply for the asynchronous traction motors.

Railway Gazette International Vol. 135 No. 7, July 1979, pp 655-657, 2 Fig., 1 Phot.

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DOTL JC

04 302165
M-K'S SULZER: A 4-CYCLE FUEL SAVER?
Morrison-Knudsen, a remanufacturer of locomotives, is promoting the Swiss-designed Sulzer four-cycle diesel engine as a replacement for two-cycle engines in its products. Tests of relative fuel consumption of both types are reported. Planned are some high-horsepower replacements of two-cycle engines with the four-cycle model.

Armstrong, JH *Railway Age* Vol. 180 No. 16, Aug. 1979, p 52, 1 Phot.

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DOTL JC

04 302329
THE US6 CONTROL APPARATUS ON THE SWITCHING DEVICE OF DB LOCOMOTIVES [Das Schaltwerksteuergeraet US6 fuer Lokomotiven der DB]
Description of monitoring devices installed in the DB's electric locomotives, which, by direct action on the switching device control, prevent overloads. The US6 control equipment also includes an automatic wheel-slip control and the possibility of regulating the tractive force. [German]

Boehm, H *Elektrische Bahnen* Vol. 77 No. 7, July 1979, pp 192-195, 6 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 302703
ITALIAN STATE RAILROAD ELECTRIC LOCOMOTIVE FLEET: PROSPECTS OF A RADICAL RENEWAL [Parco locomotive elettriche delle FS: prospective du un radicale rinnovamento]
Having mentioned the difficulties in the choice of the characteristics of stock of new construction, the article reviews the most modern solutions of a technological nature for the FS locomotives built, under construction or under study, emphasizing certain problems connected with the sizing of the electric equipment. A panorama is given of the "chopper" technique for the feed of dc traction motors, and of the inverter for the feed of asynchronous traction motors; also recalled are the problems of the generation of current harmonics connected with the presence of electronic equipment on board the vehicle. The present composition of the FS locomotive fleet and its prospects for the future are discussed. [Italian]

Cavagnaro, M *Ingegneria Ferroviaria* Vol. 34 No. 1, Jan. 1979, pp 3-13

ACKNOWLEDGMENT: EI
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DOTL JC

04 302704
MARKET PROSPECTS FOR THE ELECTROMECHANICAL INDUSTRY IN THE TRACTION SECTOR [Prospective di mercato per l'industria elettromeccanica nel settore trazione]
National demand, even with the best expectations, will not be able to absorb the capacity of the Italian national industry, which is greatly oversized. This is the basic reason which presses the electromechanical industry to pursue an export strategy. The conditions for export are: a high rate of technological innovation on products and systems, an advanced component and system design capacity, an efficient productive apparatus, significant national references. From these factors are derived the principal initiatives undertaken in recent years, among which there is principally to be remembered the project for the single-phase electrification of the Sardinian spine and the project for a locomotive with inverter and asynchronous motors. These are projects which also represent two significant examples of project collaboration between the FS and industry. [Italian]

Rizzi, C Beltrami, M *Ingegneria Ferroviaria* Vol. 34 No. 1, Jan. 1979, pp 14-17

ACKNOWLEDGMENT: EI
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DOTL JC

04 302730
THE THREE-PHASE TRACTION LOCOMOTIVES AT THE IVA '79--EXAMPLES OF A VAST FIELD OF APPLICATION [Lokomotiven mit Drehstromantriebstechnik zur IVA'79--Beispiele eines breiten Anwendungsgebietes]
Traction using three-phase current gives excellent results in electric locomotives. Various example from different railways show that this technique gives a high degree of operating flexibility and meets demands for reliable, high-quality traction. [German]

Koerber, J Teich, W *Elektrische Bahnen* Vol. 77 No. 6, June 1979, pp 151-159, 12 Phot., 24 Ref.

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

DOTL JC

04 303193
BUILDING AND THE ENTRY INTO SERVICE OF THE BB 7200 AND BB 22200 CHOPPER LOCOMOTIVES
The subjects discussed deal with the development of power thyristors, the experimental work on the units, the construction of the locomotives, the first operational results, and the performance tests. The power equipment diagrams are presented.

Coget, G (French National Railways) *French Railway Techniques* Vol. 21 No. 4, 1978, pp 221-237

ACKNOWLEDGMENT: EI
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DOTL JC

04 303627
ENERGY RATINGS OF AN ELECTRIC TRACTION MOTOR AS A FUNCTION OF ITS PARAMETERS AND LOADS [Energeticeskie pokazateli tjagovogo elektrodvigatelja v zavisimosti ot ego parametrov i nagruzok]
No Abstract. [Russian]

Kameneckij, BG *Vestnik VNIIZT* No. 1, 1979, pp 14-16

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

04 303642
EXPLANATION AND PREVENTION OF SUDDEN CURRENT CHANGES IN DIRECT CURRENT TRACTION MOTORS WITH BRIDGE CIRCUITS [Erlaeuterung und Verhuetung ploetzlicher Stromanderung bei der Brueckenschaltung von Gleichstromfahrmotoren]
To obtain normal transition from series to parallel winding, bridge circuits have been used. Even so, current fluctuations occur frequently, causing wheel slip. In order to ensure that the product of the current and inductance shall remain virtually constant in every element of the traction motor during switching of the bridge circuits, every element of the main circuit of the traction motor has to be fitted with a reactance coil, the inductance of which decreases with an increasing current. To accelerate transition, the resistance reactors in the parallel winding, forming a Wheatstone bridge, must be switched simultaneously in the principal circuit by means of thyristors. [German]

Masutomi, F *Elektrische Bahnen* Vol. 77 No. 8, 1979, pp 232-238, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 303644
PERFORMANCE LIMITS OF ELECTRIC TRACTIVE UNITS [Grenzen der Leistungsfaehigkeit elektrischer Triebfahrzeuge]
In the case of induction motors using single-phase current with a collector, limits are determined by mechanical, electrical and thermal constraints. The maximum power of a tractive unit with one-phase winding is 1,320 kW and that of one with two-phase winding is 1,760 kW. For a mixed current motor the maximum power is 2,400 kW. But because of the greater weight of the electrical equipment, the maximum power of the locomotive is only 10 percent greater. In the case of motors with three-phase current, the maximum power is 4,300 kW. [German]

Rentmeister, M *Elektrische Bahnen* Vol. 77 No. 8, July 1979, pp 220-226, 5 Phot., 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 303662
ENERGY SAVING AND TRAFFIC CONTROL THANKS TO ELECTRONIC EQUIPMENT INSTALLED ON BOARD THE VEHICLES [Economia di energia e regolazione della marcia grazie agli equipaggiamenti elettronici installati a bordo]
The functional aspects of the operation of traction units for which electronics appear as an instrument of improvement of considerable importance are examined. The principal solutions and applications carried out by the Swiss Company Secheron are described and illustrated by detailed graphs and diagrams. [Italian]

Garnier, J-P *Ingegneria Ferroviaria* Vol. 34 No. 1, Jan. 1979, pp 18-30

ACKNOWLEDGMENT: EI
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DOTL JC

04 304078
STATIONARY FLYWHEEL ENERGY STORAGE SYSTEM SSB
The study investigates whether the braking energy expended on the projected down-grade tunnel section of the Stuttgart Stadtbahn can be

economically rewon by means of a stationary flywheel storage system. A design concept was drawn up for a low-loss large flywheel store of up to 25 Mg rotating mass and the service life of forged steel flywheels investigated. The final design resulted in a system with a 5 Mg flywheel and field rheostat controlled dc motor as an electromechanical converter. Study of the energy flux ratios in the light railroad power network revealed that 680 MWh of electrical energy could be saved annually. Plant costs (without conversion) for a tested plant would amount to DM 962,000. With savings in power costs of 80,000 to DM 100,000 per year and depending on interest rates and on rates of increase in electrical current price the plant would be amortized in 12 to 22 years compared to an expected service life of more than 30 years. (ERA citation 04:030643)

U.S. Sales Only.

Zwerenz, W Schauberger, H
Maschinenfabrik Augsburg-Nuernberg AG Nov. 1978, 153 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

BMFT-FB-T-78-11

04 304428
DEVELOPMENT AND EVALUATION OF MATERIALS FOR HIGH TEMPERATURE LITHIUM/SULFUR RECHARGEABLE BATTERIES

Electrochemical energy storage is being achieved by the development of high-temperature rechargeable batteries. Li--Al/FeS secondary batteries are being developed for use of power sources for electrical vehicles and as stationary energy storage devices for load-leveling on electric utilities. This battery could be recharged by the electricity produced via photovoltaic solar energy, nuclear energy, or coal-steam turbines. The high temperature corrosiveness of the active materials and molten electrolyte places severe restriction on the type of materials that can be used for current collectors, separators, and feedthrough insulators. Out-of-cell and in-cell tests are being conducted to identify the materials that are compatible with this cell environment. The corrosion test procedures, the nature and kinetics of the corrosion reactions, and the development and testing of electrode separators are discussed. (ERA citation 04:044877)

Swaroop, RB Smaga, JA Battles, JE
Argonne National Laboratories, Department of Energy Mar. 1979, 29 p.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DOE/TIC-10098

04 304429
BATTERY TECHNOLOGY: AN ASSESSMENT OF THE STATE OF THE ART

As a result of increased interest in battery technology and its potential to aid in meeting the national energy goals, a state-of-the-art battery technology survey was undertaken to provide a data base for understanding and evaluating the various program efforts and the relative merits of battery technology. It summarized the technology as it is today and estimated the progress likely to be achieved in the next few years. Basic data for each battery type are summarized; a general discussion of other potential battery systems is included. A comparative summary of battery cost and performance is presented. Actual battery capabilities are discussed relative to the general requirements of electric utility load leveling and transportation applications. The current status of the scarce materials and environmental and safety problems related to battery technology are presented. The overall status of the current R and D programs and expected progress toward commercialization is given, and the roles of competing technologies in two major markets for battery technology are discussed. General observations, conclusions, and recommendations are summarized.

TRW, Incorporated, Department of Energy Mar. 1978, 66 p., 9 Fig., 25 Tab.

Contract EX-76-C-10-3885

ACKNOWLEDGMENT: NTIS
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DOE/TIC-10146

04 304675
ENERGY STORAGE PROPULSION SYSTEM FOR RAPID TRANSIT CARS. TEST RESULTS AND SYSTEM EVALUATION

The principal objectives of this test program were to evaluate the ability of the Energy Storage (ES) System to: reduce propulsion energy usage; reduce propulsion power demands; and reduce tunnel heating caused by propulsion energy use. This report describes the test and evaluation of the ES system for rapid transit cars. The characteristics of the system were investigated in the real world by installing the novel equipment under two New York City subway cars and operating the cars both under test track conditions and in revenue service on several lines of the New York City Transit System. Tunnel heating effects, power reduction, gyroscopic forces, and other characteristics were investigated and evaluated. Overall propulsion energy reductions of 14-26%, as compared with conventional equipment, were measured in revenue service operations. Further reductions should be attainable by this system, if improvements derived from this test program were to be incorporated into the equipment and control configuration. The authors state that the equipment tested under the two R-32 cars demonstrated that on-board flywheel energy storage is an impressive means for achieving major savings in transit car propulsion energy. Part II of this report describes the methods for applying the energy conservation data to rapid transit systems other than New York's. Appendixes are provided which give specific information on the New York subway routes and on the instrumentation used.

Sponsored in part by New York State Dept. of Transportation, Albany, and AiResearch Mfg. Co., Torrance, CA. See also report dated Sep 75, PB-249063.

Raskin, D
Metropolitan Transportation Authority (New York), Urban Mass Transportation Administration, New York State Department of Transportation, AiResearch Manufacturing Company, (UMTA-NY-06-0006) Final Rpt. UMTA-NY-06-0006-78-1, Oct. 1978, 136 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300918/0ST

04 307672
CHECKING THE RUBBER ELEMENTS IN ALSTHOM DRIVES BY QUILL-TO-WHEELS DISPLACEMENT

Increase in train speeds and lengthening periods between overhauls call for new inspection techniques. This article describes one program at the Polish Railway Research Institute.

Pawlus, JM *Railway Engineer International* Vol. 4 No. 5, Sept. 1979, pp 61-66, 8 Fig., 1 Tab., 2 Phot., 2 Ref.

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

DOTL JC

04 307676
ELECTRONICS OPTIMIZE TRACTION VEHICLE OPERATION
[L'electronique optimalise le fonctionnement des vehicules de traction]

A short description of automated functions: current regulation and high-power switchgear control (contactors, graduators or thyristors): acceleration control; speed control; accurate automated stopping; slipping control under traction and when braking; compliance with train timetables with minimum energy consumption ("Optimized driving" system). [French]

Garnier, J-P Riondel, P *Brown Boveri Review* Vol. 66 No. 7, 1979, pp 467-473, 14 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland

04 308260
EVALUATION OF SILICONE FLUID FOR REPLACEMENT OF PCB COOLANTS IN RAILWAY INDUSTRY

Electrical performance evaluations were made on a railway transformer which was retrofilled with 50 cs polydimethylsiloxane. Comparisons of the data from the PCB-filled transformer retrofilled with the silicone oil indicated no reduction in operating performance. Analyses of the various flushing cycles and of the final silicone fluid showed that the most efficient flush method was to circulate solvent in the completely filled unit, followed by solvent removal and a subsequent silicone fill. Residual levels of PCB's

were found to be stabilized at 3.47% two weeks after retrofilling. Investigations were carried out to determine possible temperature changes which could occur with a silicone retrofilled transformer. A maximum rise of 2.7 degrees C was observed with this type of retrofill. This small increase in temperature for a forced air cooled transformer could have a minimal effect on transformer performance.

Walsh, EJ Voytik, DE
Westinghouse Electric Corporation, Federal Railroad Administration
Final Rpt. FRA/ORD-79/37, DOT-TSC-FRA-79-10, June 1979, 54 p., Figs., Tabs., 8 Ref., 1 App.

Contract DOT-TSC-1294

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04 308279
FLYWHEEL ENERGY STORAGE SWITCHER. VOLUME II--FIELD DATA
This is Volume II of the two-volume report, Flywheel Energy Storage Switcher Final Report. The report comprises: Volume I-Summary and Detailed Description of Analysis; Volume II-Field Data; Volume II contains supporting information and detailed data developed during switchyard and locomotive test phases.

McConnell, R
AiResearch Manufacturing Company, Federal Railroad Administration
Final Rpt. FRA/ORD-79/20.2, 79-15651-2, Apr. 1979, 363 p.

Contract DOT-FR-777-4247-2

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04 308280
FLYWHEEL ENERGY STORAGE SWITCHER. VOLUME I--STUDY SUMMARY AND DETAILED DESCRIPTION OF ANALYSIS
An indepth study of the application of flywheel energy storage to the railroad switchyard locomotive was conducted to determine the practicality and viability of such a system. the system, as originally conceived, required the use of separately excited traction motors, and a major task of the study was to test separately excited version of the Electro-Motive Division's D77 traction motor. The attractiveness of the system is very dependent on the operational scenario of the switching locomotive. Therefore, the study examined the operation of locomotives at three flatyards: Dillard (Southern Railway System), Baldwin (Seaboard Coast Line), and Whitefish (Burlington Northern). Also, a large amount of data concerning the operating environment of switching locomotives was collected. It was concluded early in the study that a boxcar was required to carry the energy storage unit because no room existed on the locomotive. This, combined with the increased auxiliary load, results in the same energy consumption with or without the FESS system, for a typical flatyard operation in spite of the energy recuperated and reused. Brake maintenance savings, although significant, are not sufficient to give an attractive return on investment.

Cook, LM Curran, WT McConnell, R Smith, AK
AiResearch Manufacturing Company, Federal Railroad Administration
FRA/ORD-79/20.1, 79-15651-1, Apr. 1979, 329 p., Figs., Tabs.

Contract DOT-FR-777-4247-1

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PB80-121478, DOTL NTIS, DOTL RP

04 308286
SINGLE-MOTOR BOGIES FOR METROPOLITAN TRAINS [Carrelli monomotori per metropolitane]
After listing the types of two-motor bogies in service on Italian metropolitan lines, the writer describes an experimental single-motor bogie, four units of which are in service on the Milan metro, and have covered a distance of over 100,000 km. This description is followed by comparisons with the main types of single-motor bogies in service on European metropolitan lines. [Italian]

Vigliani, U *Ingegneria Ferroviaria* Vol. 34 No. 7-8, July 1979, pp 485-495, 19 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

04 308307
ELECTRONIC MONITORING OF VEHICLES IN SHORT-DISTANCE PUBLIC PASSENGER TRANSPORT [Elektronische Fahrzeugueberwachung im OPNV]
The high costs of staffing short-distance public passenger transport have led to rapid extension of driverless operating, particularly on the metropolitan railways. A system for capturing errors of evaluation, being tested in Hamburg, is likely to ensure complete safety in operation. The system is described, and a detailed description is given of the capture, storage and detection and evaluation of errors, with possibilities for further development. [German]

Weiss, HH *TU-Sicherheit u Zuverlaessigkeit in Wirtschaft* Vol. 20 No. 7, 1979, pp 308-310, 5 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: VDI-Verlag GmbH, Postfach 1139, Graf-Recke-Strasse 84, 4 Dusseldorf 1, West Germany

04 308445
LOCOMOTIVES WITH THREE-PHASE AC MOTORS [Locomotiven fuer Drehstrom-Leistungsuebertragung]
Preliminary results of newly designed locomotives Henschel-BBC-DE2500 are presented and discussed. These all-purpose locomotives have 1.4 Mw asynchronous motors. [German]

Kademann, S *Thyssen Technische Berichte* Vol. 11 No. 1, 1979, pp 8-14, 4 Ref.

ACKNOWLEDGMENT: EI
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05 053337
BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS. CORRELATION BETWEEN THE CHEMICAL AND PHYSICAL PROPERTIES AND THE BEHAVIOUR OF DISC BRAKE PADS DURING BRAKE APPLICATIONS
This report deals with investigations made into the correlation of the physical and chemical properties (hardness, Young's modulus, density, flammability, acetone extraction) with the service performance characteristics (friction coefficient, wear, interaction) of brake pads for disc brakes.

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

International Union of Railways B 126/RP 5, Apr. 1979, 17 p., 18 Fig., 3 Tab.

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05 300630
INVESTIGATION OF THE RESISTANCE TO MOISTURE EFFECTS OF COILS USED FOR RAILROAD BRAKES [Badanie odpornosci cewek hamulcow szynowych na dzialanie wilgoci]
The causes of defects of rail brake coils and the results of tests of individual coil insulating elements are discussed. This includes the winding insulation of the impregnating medium, and the method of impregnation as well as the technology of depositing the protective layer on the winding. Guidelines are presented for increasing the reliability of rail brake coils. [Polish]

Kobylecki, A Trzecinski, K *Przeglad Elektrotechniczny* Vol. 54 No. 10, Oct. 1978, pp 436-437, 2 Ref.

ACKNOWLEDGMENT: EI
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05 301186
RESULTS OF FRICTION AND WEAR TESTS ON MATERIALS FOR ROLLING STOCK BRAKE SHOE INSERTS [Wyniki badan tarciowo-zuzyciowych tworzyw na wstawki hamulcowe pojazdow szynowych]
Technical requirements for cast iron and plastic friction materials used for brake shoe inserts. Physical and chemical properties as regards friction and wear for these materials, average wear, curves for coefficient of friction according to linear speed of the wheel. Conclusions concerning requirements for brake insert friction materials. [Polish]

Bros, J *Trakcja i Wagony* Vol. 2-26 No. 2, Feb. 1979, pp 50-53, 4 Tab., 3 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

05 301187
A NEW FLANGED DESIGN FOR BRAKE SHOE INSERTS [Nowa konstrukcja wstawek hamulcowych z obrzezem]
The new type of brake shoe insert features the introduction of other steel components, other shapes and fitting techniques. Tests and experimental operation have confirmed the usefulness of the introduction of such changes as an improvement in the quality of the brake shoe inserts and a simplification of the shape of their components. [Polish]

Glowaczewski, M Polek, J *Trakcja i Wagony* Vol. 2-26 No. 1, Jan. 1979, pp 16-20, 4 Fig., 1 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

05 301204
NEW DEVELOPMENTS IN THE FIELD OF ELECTROPNEUMATIC BRAKE CONTROL SYSTEMS [Neue Entwicklungen auf bem Gebiet der Elektropneumatischen Bremssteuerungen]
Different methods of electric transmission as well as of electric or pneumatic processing of the braking signal are compared with each other to demonstrate the potential of electropneumatic braking control and its characteristic features. The electropneumatic transducer and its further development are dealt with in particular detail. The study of a brake control system in a closed-loop deceleration circuit illustrates the dynamic behaviour and the controllability of a braking system put into practice. [German]

Lohmeier, P Kessel, G *Glasers Annalen ZEV* Vol. 103 No. 2-3, Feb. 1979, pp 125-135

ACKNOWLEDGMENT: EI
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DOTL JC

05 301422
REDUCTION OF ENERGY REQUIREMENTS WITH REGENERATIVE BRAKING ON ELECTRIC VEHICLES [Energiebedarfssenkung durch Nutzbremsen bei Elektrofahrzeugen]
Comparative appraisals for different types of vehicles show that some 20 to 50% of energy can be saved by regenerative braking on railway vehicles in short-distance traffic. On the other hand, in the case of road vehicles, the energy saving is only 5 to 25% because of the higher resistance to forward motion of pneumatic tyres. [German]

Roeder, G *Elektrische Bahnen* Vol. 50 No. 4, 1979, pp 86-96, 2 Tab., 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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05 301822
Z1AW BRAKE CONTROL VALVE WINS PROVISIONAL AAR APPROVAL
Development of the first air brake control valve for AAR service by a firm outside the U.S. has culminated in provisional approval for the Z1AW valve of Britain's Westinghouse Brake and Signal Co. The seven years of design and tests are described.

Wickham, DJ (Westinghouse Brake and Signal Company Limited) *Railway Gazette International* Vol. 135 No. 9, Sept. 1979, p 839, 2 Phot.

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05 303258
FIRST INTERNATIONAL BRAKING CONFERENCE MARKS CENTENARY OF GALTON'S TESTS
The first International Conference on Railway Braking in York in September 1979 revealed wide areas of disagreement surrounding the choice of techniques and materials used in friction braking, whether applied to the tread or to a disc. With adhesion occasionally dropping as low as 0.03 due to contamination, even though brake designers specify 0.09 under adverse conditions, retardation can require rapid adjustment of braking force to maintain a low rate of slip. Despite some reservations about the value of today's wheel slide protection, microprocessors are likely to provide an answer once rapid-response actuators are available.

Railway Gazette International Vol. 135 No. 11, Nov. 1979, p 1019, 3 Phot.

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DOTL JC

05 303261
DEVELOPMENT OF BRAKE DISTRIBUTORS IN EUROPE
Reviews progress and describes one of the latest developments in distributors (graduable release air brake control valves).

Railway Engineer International Vol. 4 No. 5, Sept. 1979, pp 41-42, 2 Fig.

ACKNOWLEDGMENT: British Railways
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DOTL JC

05 303600
THE INFLUENCE OF BRAKE SHOES ON THE TEMPERATURES OF WHEELS IN RAILROAD SERVICE
Field tests were conducted to verify and gather additional information concerning interior wheel temperatures, hot spot temperatures on wheel treads, braking forces, and coefficients of friction during actual service type braking with different types of brake shoes. The tests were conducted with either constant brake shoe loads or constant braking horse-powers. The purpose of these tests was to obtain a better understanding of the variations which occur in service to enable better simulation of wheel stress analysis computer programs, improve laboratory dynamometer simulation of service conditions, and determine possible causes of thermal cracking of wheels in service. The results of these field tests are compared to tests previously conducted in service and in the laboratory.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting,

New York, New York, December 2-7, 1979.
Wetenkamp, HR (Illinois University, Urbana); Eck, BJ (Griffin Wheel Company); Rhine, PE (Union Pacific Railroad)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-2, Aug. 1979, 5 p., 6 Fig., 4 Tab., 4 Ref.

ORDER FROM: ESL

05 303609
SINGLE LEAK DETECTION METHODS APPLIED TO A BRAKE PIPE MODEL
Whereas there exists a procedure for detecting presence of excessive leakage in a brakepipe, the methods employed in actually locating the leaks are still very crude. Such methods are invariably labor intensive and time consuming, requiring railway personnel to walk alongside the train to look for audible leaks either by the unaided ear, or sometimes with a sonic-meter. This paper proposes three methods of locating single-faults, all based on a limited number of pressure measurements (possibly localized at the front-end or the rear-end of the train).

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Aula, V Cheng, RMH Katz, S (Concordia University, Canada)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-11, Aug. 1979, 8 p., 13 Fig., 1 Tab., 12 Ref.

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05 303614
THE EFFECT OF LEAKAGE DISTRIBUTION ON BRAKE PIPE GRADIENT AND BRAKE PIPE FLOW
A mathematical model for the freight train Brake Pipe and Air Brake System is used to predict the effects of leakage and its distribution on brake pipe flow, brake pipe leakage and brake pipe gradient for trains from 10 to 150 cars. Possible flow and gradient methods of judging train fitness are compared to the present method through the use of computer simulations. As the leakage distribution is varied for different length trains, air flow into the brake pipe, brake pipe pressure gradient, and measured brake pipe leakage values are compared to the various fitness criteria.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Shute, BW Wright, EC Taft, CK Banister, WN (New Hampshire University)
American Society of Mechanical Engineers Conf Paper 79-WA/RT-16, Aug. 1979, 11 p., 13 Fig., 3 Ref.

ORDER FROM: ESL

05 307659
A NEW INTERFACIAL FRICTION CONCEPT FOR ON-TREAD BRAKING OF RAILWAY ROLLING STOCK
Composite 655/C, originally developed for suburban and main line passenger services in South Africa, recently completed a two year service period on a bullet-nosed test locomotive hauling an unbraked test vehicle equipped with "High Stability" trucks. Full brake applications on down-grade from initial speeds ranging between 200 km/h and 245 km/h were made, resulting in peak energy dissipation rates in the order of 1000 kW/wheel. Subsequent examination of tread surfaces following a series of more than fifty stops from above 200 km/h indicated that no thermal cracking took place. Simultaneously with the above, composite 840/N was developed for direct replacement of cast iron on freight stock. Considerable operational improvements and economic savings on materials consumed, labor, tread wear, and increased payloads were actually established under practical conditions. Approximately 30,000 freight vehicles have to date been converted in South Africa. This involves all air braked trains; a conversion program for extended testing on vacuum braked vehicles continues on the remaining fleet of approximately 112,000 four-axle freight vehicles. It is anticipated that the latter will, in the near future, also be able to operate at considerably reduced running cost and greater operational safety. Depending on applicable circumstances, consideration will then be given to improve on the present average operating speeds in general.

Barnard, JH *Rail International* No. 9, Sept. 1979, pp 727-734, 4 Fig., 1 App.
ORDER FROM: ESL

DOTL JC

05 308305
RAILWAY BRAKING: A HISTORY
No Abstract.

Sharpe, AC *Engineering* Vol. 219 No. 9, Sept. 1979, p 1112, 6 Phot.

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

DOTL JC

06 053336
ADAPTATION OF MARSHALLING YARDS FOR TAKING WAGONS WITH WHEELBASE OF MORE THAN 14 M. PRELIMINARY STUDY OF EXISTING AUTOMATIC MARSHALLING YARD
This report contains a technical study of the solutions which are already applied to existing marshalling yards. It shows the scope of the problem and assesses the present solutions for the automatic hump shunting of very long wagons.

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

International Union of Railways D 147/RP 1, Oct. 1978, 60 p., 43 Fig.

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06 053341
ADAPTATION OF MARSHALLING YARDS FOR TAKING WAGONS WITH A WHEELBASE OF MORE THAN 14 M. EVALUATION OF EXISTING SOLUTIONS FOR PERMITTING VERY LONG WAGONS TO BE HUMP SHUNTED WITH AUTOMATIC CONTROL
This report presents a choice of solutions for the installations of existing marshalling yards taking into account the economic aspect. It contains the measures to be provided in future marshalling yards, which also depend on economic criteria.

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

International Union of Railways D 147/RP 2, Apr. 1979, 46 p., 3 Fig., 15 Tab.

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06 053342
TRANSMISSION OF SAFETY INFORMATION. ASSESSMENT OF RECENT TECHNOLOGICAL PROGRESS RELEVANT TO THE TRANSMISSION OF SAFETY INFORMATION
This report is intended as a supporting document for a feasibility study requested by the ORE Control Committee at their 80th Meeting in October 1977. This DT also expands some of the topics presented in DT 86, prepared by the ORE A 118 Committee. The author of the present DT has been a member, and later Conseiller Technique of this Committee. This study would suggest that there is a strong case for international collaboration in this field.

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

Gelbstein, E
International Union of Railways DT 95 (S1019), Oct. 1979, 16 p.

ORDER FROM: UIC

DOTL RP

06 197315
OPTICAL AUTOMATIC CAR IDENTIFICATION (OACI). VOLUME III. OPTICAL PROPERTIES OF LABELS
The results of a study on the optical properties of Optical Automatic Car Identification (OACI) labels (modules) and the review of the physical and chemical properties leading to a better understanding of the tests conducted on Improved Surface Treatment, Standard, and overlayed labels are presented. Label operational lifetime is defined using as criteria a reduction to 5% of the original label retroreflectance during that period. Based on the IST tests, the estimated operational life of those labels in that environment will be on the order of 12 years, provided that no failure in substrate or mechanical action on the label occurs. This life estimate is compatible with test data from OACI modules. Solar radiation is identified as the major cause of non-reversible mechanisms determinant of OACI label operational life. Other operational and environmental factors with reversible and non-reversible components are identified. Some OACI label alternatives are suggested. Experiments and evaluations of OACI labels by the Association of American Railroads and railroads are indicated.

See also Volume 1, PB-291 877.

Ingrao, HC
Cambridge Systems Corporation, Federal Railroad Administration Final Rpt. FRA/ORD-78/15.III, CSC-77-102, Mar. 1979, 238 p.

Contract DOT-FR-74292
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-294202/7ST, DOTL NTIS

06 197610
COMMUNICATION SYSTEM STANDARDS, TASK 206. NORTHEAST CORRIDOR IMPROVEMENT PROJECT
The report establishes the standards to be followed by designers in developing the Northeast Corridor (NEC) communication system. The proposed communication system supports other major functional systems such as centralized traffic control, supervisory control, and data acquisition for the electric traction power system, security, maintenance, and administration, in addition to a number of other users on and off the NEC. The proposed communication system will provide full communication service for the support of all railroad operations. Dual path redundancy will be provided for critical circuits to support all essential operations. The communication system concept envisions a trunk line connecting major nodes, each governing local distribution networks connecting a number of local terminals along the Corridor.

De Leuw, Cather-Parsons and Associates, Federal Railroad Administration Final Rpt. F206-60, FRA/NECPO-79/7, Apr. 1979, 33 p.

Contract DOT-FR-76048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-296368/4ST, DOTL NTIS

06 197888
RELIABILITY IMPROVEMENT OF BART TRAIN CONTROL
Results of a two-year effort of a task group to improve the reliability of the Bay Area Rapid Transit district's vehicle-borne Automatic Train Control equipment are reported. The effort included modifications to the train control equipment designed both by the manufacturer and by the task group. It also included the development and implementation of improved maintenance test procedures and equipment. A significant constraint on this effort was the need to maintain, and where necessary, improve the fail-safe nature of the train control system. Particular attention was paid to reducing the fraction of maintenance diagnoses which resulted in a No Trouble Found report; at the start of the task-team effort, these represented half of the revenue service failures of this system. A substantial improvement in the maintenance capability and decrease in service failures has resulted from this effort.

29. IEEE Vehicular Technology Conference, Chicago, IL, USA, 28 Mar 1979.

Turner, DB
California University, Berkeley, Department of Energy CONF-790303-1, June 1978, 22 p.

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

LBL-8288

06 198186
EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY. TASK 1: ASSESSMENT OF SIGNAL/CONTROL TECHNOLOGY AND LITERATURE REVIEW
The report presents the results of an investigation to obtain an assessment of the present technologies in use throughout the world for railroad signals and control systems applicable to high-speed passenger trains. Questionaires were developed and sent to foreign and domestic railroads, rapid transit systems, and manufacturers of signal and control equipment. Railroads, transit systems and manufacturers were visited and interviewed. Many hundreds of articles and technical papers were researched. Over 250 were cataloged, translated and cross-indexed to form a complete technical library. This inventory data has been arranged to permit a logical review of all known technology in relation to each type of railroad signal or control system or subsystem(s).

Prepared in cooperation with Kentron, Inc., Dallas, TX. See also RRIS 06A 160400.

Taylor, SF Marshall, JF Schultz, CM Whalen, RB
STV, Incorporated, Dyer (Thomas K), Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-78/39.1, Dec. 1978, 191 p.

Contract DOT-FR-773-4236
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-296494/8ST, DOTL NTIS

06 300560
CUSTOMIZED CTC
Canadian National has been developing a centralized traffic control which is based on a building-block principle and will utilize computer-aided dispatching and data storage which can eliminate all paper work. Applied on a secondary main line, CN's system is known as Rail Traffic Control incorporates 16 display and control sections, a communications facility, minicomputer, cathode ray tubes and back-up modules for operating up to 40 sidings on a single-track line.

Progressive Railroading Vol. 22 No. 7, July 1979, pp 67-68, 1 Phot.

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

DOTL JC

06 300561
TOWARDS A FULLY-AUTOMATED LONDON UNDERGROUND
In the decade since the Victoria line opened, microprocessors have greatly advanced prospects for automating urban railways at acceptable cost. Signaling and power supplies can be centrally supervised using Visual Display Units by staff relieved of routine functions while Automatic Revenue Collection will cut losses from fraud. The major boost to service quality will come from unmanned trains that can maintain frequent service at "unsocial" hours in an era or chronic staff shortages. Each new group of LT cars brings full automation a step closer by providing the necessary hardware and software components.

Maxwell, WW (London Transport Executive) *Railway Gazette International* Vol. 135 No. 6, June 1979, pp 522-526, 8 Phot., 2 Ref.

ORDER FROM: ESL

DOTL JC

06 300580
AUTOMATIC TRAIN CONTROL SYSTEM BASED ON EQUIDISTANT TRACK CIRCUITS WITH DECENTRALIZATION OF LINE EQUIPMENT [Linienfoermiges Zugsicherungs-und Zugsteuerungssystem auf der Grundlage aequidistanter Gleisstromkreise mit Dezentralisierung der Streckenausruestung]
No Abstract. [German]

Wojanowski, E
Technical University of Braunschweig, West Germany DB: Dok 4863, 1978, 167 p., 16 Tab., 45 Phot., 33 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Technical University of Braunschweig, West Germany, Schriftenreihe Inst f Verkehr, Eisenbahn u Verkehrssich, D-3300 Braunschweig, West Germany

06 300586
SIGNALLING PROVIDES FOR AUTOMATION
Description of the signaling equipment and automated systems used on urban and suburban railway lines in the Amsterdam area.

International Railway Journal Apr. 1979, p 44, 9 Fig., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013

DOTL JC

06 300590
AUTOMATIC LINE-CLEARANCE CONTROL DEVICE ON NEW DB LINES [Die selbsttaetige Gleisfreimeldung auf den Neubaustrecken der Deutschen Bundesbahn]
No Abstract. [German]

Czehowsky, J *Signal und Draht* Vol. 71 No. 1-2, Jan. 1979, pp 13-17, 4 Phot.

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

06 300616
RADIOCOMMUNICATION IN THE TUNNEL AND UNDERGROUND STREET
Experimental results are presented to show that radio communication is possible in a tunnel. Values of attenuation as a function of propagation distance are given. It is concluded that a tunnel acts as a kind of high pass transmission line similar to a circular waveguide.

Conference on Communications Equipment and Systems, Birmingham, England, April 4-7, 1978.

Chiba, J (Tohoku University, Japan); Inaba, T Kuwamoto, Y Banno, O Sato, R
Institution of Electrical Engineers IEE Conf Publ n162, 1978, pp 163-165

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

06 301158
ESKD-72 ELECTRONIC DISPATCHING CONTROL SYSTEM [Elektroniczny system kontroli dyspozytorskiej ESKD-72]
The logic structure and operating principle of the ESKD-72 electronic dispatching Control System designed at the Institute of Railway Research (COBiRTK) and applied in the traffic department in the Warsaw region. The deciphering and decoding process is described. [Polish]

Karpisz, M Zoltek, S *Automatyka Kolejowa* Vol. 2-26 No. 1, Jan. 1979, pp 11-16, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Automatyka Kolejowa, Warsaw, Poland

06 301174
INTERFERENCE FROM THYRISTOR EQUIPPED LOCOMOTIVES ON TELECOMMUNICATION CABLES [Pertubations, dans les cables de telecommunication, par les locomotives equipees de thyristors]
Survey made with the assistance of the SNCF, to calculate the interference on telecommunication cables laid by the line, from the eddy currents produced by railway electrified lines, where locomotives are thyristor equipped both with A.C. or D.C. choppers. Remedies are suggested to reduce the amount of interference. [French]

Bendayan, J Emprin, P *Cables et Transmission* Vol. 33 No. 2, Apr. 1979, pp 88-103, 10 Phot., 16 Ref.

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

06 301178
PARTIAL APPLICATION OF MARKOV RELIABILITY MODELS IN RAILWAY SIGNALLING [Das Semi-Markowsche Zuverlaessigkeitsmodell in der Eisenbahnsicherungstechnik]
A series of railway safety systems includes both constant and variable elements, and, in these conditions, Markov's models cannot be applied. Calculation is however possible with a half version of Markov's reliability model. The article gives a typical application where elements are presented by means of simple examples. [German]

Fischer, K Beichelt, F *DET Eisenbahntechnik* Vol. 27 No. 5, May 1979, pp 183-185, 4 Fig., 1 Tab., 17 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

06 301193
SELECTING FIBRE-OPTIC CABLE FOR DATA TRANSMISSION
Outlines a method for selecting a suitable fibre-optic cable taking into account transmitter power, distance of transmission and receiver sensitivity.

Isaacson, R *Engineering* Vol. 219 No. 6, June 1979, pp 769-771, 3 Fig.

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

DOTL JC

06 301318
LIGHT-RAIL TRANSIT SIGNALING
This paper presents considerations regarding conventional signal systems that should be helpful to people planning a light-rail system. Attention is

first directed to establishing the need for a signal system, including a discussion of its advantages and disadvantages on the basis of the technical, operational, economic, labor, and regulatory elements involved. A definition of conventional signal systems is provided, and the various types of systems are explained on the basis of their capabilities. Safety and failure modes are addressed as the key issues in any signal-system design. To illustrate the importance of all these factors, a comprehensive description of the new San Francisco Municipal Railway's subway signal system is presented, and conclusions are then drawn as to the general design concepts required for other future light-rail systems. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Burgin, EA (Klauder (Louis T) and Associates) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 119-123

ORDER FROM: TRB Publications Off

06 301426
AN APPLICATION OF MICROCOMPUTERS TO RAILWAY SIGNALLING: THE PRS TYPE SIGNAL BOX SIMULATOR [Une application de la micro-informatique a la signalisation ferroviaire: le simulateur de poste d'aiguillage de type PRS]

Microprocessing has made it economically possible to develop an all-relay signal box (PRS) simulator, which can carry out a large number of signaling functions. Better knowledge of microprocessing by a number of railway signaling experts will enable computerized signaling systems to be set up in the future; the PRS simulator has already been used in setting up a system for monitoring train movements and automatic route control on the "Left Bank" cross-Paris line. [French]

Auclair, J-P *Revue Generale des Chemins de Fer* Vol. 98 May 1979, pp 263-268, 5 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

06 301432
MICROELECTRONICS FOR SAFE AND SPEEDY RUNNING [Mikroelektronik fuer sicheres und schnelles Fahren]

The author reports on progress achieved in the use of the most up-to-date microelectronics technology on the German Federal Railway for operating marshalling yards and continuous control of train running, with signalling worked from signal boxes and from the control operating control posts. [German]

Wehner, L *Eisenbahningenieur* Vol. 30 No. 5, 1979, pp 189-193

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

06 301433
PROSPECTS FOR THE USE OF SOLAR ENERGY [Prospettive di applicazione delle celle solari]

The author describes the principles behind manufacture of a solar cell for transforming solar energy into electricity and then mentions the ways such energy can be used on the railways. He then compares the economic aspects of different sources of electricity: batteries, solar cells, national grid. [Italian]

Giuliattini, GL *Ingegneria Ferroviaria* Vol. 34 No. 3, Mar. 1979, pp 191-199, 2 Tab., 10 Phot., 9 Ref.

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

DOTL JC

06 301812
POTENTIAL OF FIBRE OPTICS FOR TRANSPORTATION APPLICATIONS

Fiber optics, the technology of transmitting monochromatic modulated light beams through transport conduits, has evolved rapidly as a means of communicating information. This study, preliminary but reasonably comprehensive, was done as a basis for making decisions about a demonstration of fiber optic systems in one or more transport applications. It compares fiber optics with conventional communications components on the basis of capital and operating costs, reliability, versatility and other criteria. The most promising applications and sites are identified. Preliminary estimates of costs, organizations and implementation strategies are given. Onboard applications on ships, aircraft and trains are considered, as well as stationary systems for information, control and surveillance. Applications requiring broad bandwidth and immunity to electromagnetic interference are of special significance; the uncertainty about the reliability of fiber optics would inhibit some applications.

IBI Group-Beinhaker Irwin Associates Group, Transport Canada Research and Development Centre TP 1804, Nov. 1978, 40 p.

ORDER FROM: IBI Group-Beinhaker Irwin Associates Group, 40th University Avenue, 6th Floor, Toronto, Ontario M5G 1T1, Canada

06 301823
RAILROADS PLUG IN TO SOLAR POWER

Solar power, or photovoltaics, has applications in various facets of railroading. Most are in the remote location category and include track circuits, intermediate signals, radio and microwave facilities and similar communication and signal installations where commercial line power is not readily available. Now cabooses are being fitted with solar cells for powering warning lights when assigned on short runs and no other power source is practicable.

Armstrong, JH *Railway Age* Vol. 180 No. 18, Sept. 1979, pp 16-20, 2 Phot.

ORDER FROM: ESL

DOTL JC

06 302147
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM

A new microwave AVI system has been developed that is characterized by the fact that it utilizes ceramic resonators in the composition of a transponder identification code, and a single microwave carrier to convey an interrogation signal to, and a response signal from, that transponder. In this system, the transponder is a completely passive device that requires neither a battery nor any other power supply, and is of a compact, light-weight and slim construction. This paper describes the system structure, the operational principles of the interrogator and transponder, and the transponder circuit structure.

Sakuragi, J
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 72-78

ACKNOWLEDGMENT: EI
ORDER FROM: Institute of Electrical and Electronics Engrs, Inc, Service Center, 445 Hoes Lane, Piscataway, New Jersey, 08854

06 302178
DEVELOPMENT OF AN INDUCTIVE COMMUNICATIONS SYSTEM FOR MORGANTOWN PEOPLE MOVER

The Morgantown People Mover (MPM), located at Morgantown, West Virginia, uses low and medium frequency inductive communications for the wayside-to-vehicle (uplink) and vehicle-to-wayside (downlink) communication links. The system has six uplink and one downlink tones in the low frequency (6-50 kHz) range used to communicate speed, switch, calibration, and stop commands and the collision avoidance "safe to proceed" signal, also downlink switch verification. In the medium frequency range (90-130 kHz) uplink (command) and downlink (status) digital data are transmitted using two-tone FSK messages. The vehicle interfaces with inductive loops in the guideway surface which range from ten to one thousand feet in length and are driven through feedlines of up to several thousand feed in length. This paper discusses the development of the MPM Inductive Communication System. Included is a brief history of the Morgantown People Mover and an overview of the Inductive Communications System presently in use. Each subsystem is discussed and significant design considerations along with operational data are presented. Emphasis is placed on the experience with this mode of communications.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Johnstone, TN (Boeing Aerospace Company)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 348-356

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

06 302325
HERMES: THE UIC DATA TRANSMISSION NETWORK [HERMES: Le reseau de teleinformatique de l'UIC]
In 1971, the UIC decided to study an international data transmission network, named HERMES. The article supplies information on the studies carried out, on present thinking in the UIC and on the problems to be solved in the fields of transport, communications and the necessary installations. It explains the situation at the beginning of 1979, before concluding with details of the expected development of the work. [French]

Dreyfus, H Grassl, A *Rail International* Vol. 10 No. 8, Aug. 1979, pp 697-703, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

06 302720
SNCF SIGNALLING SYSTEM FOR HIGH SPEED TRAFFIC AND POSSIBILITIES OF EXTENDING IT [Le systeme de signalisation SNCF pour les tres grandes vitesses et ses possibilites d'extension]
No Abstract. [French]

Weber, O *Rail International* Vol. 10 No. 7, July 1979, pp 667-672, 4 Phot.

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

DOTL JC

06 302726
THE DB'S OPERATING CONTROL CENTER IN SAARBRUCKEN [Betriebssteuerzentrale der Deutschen Bundesbahn in Saarbruecken]
Safety, preparation and signalling for routes require a vast amount of data that man is no longer capable of collecting and processing. This is why process computers are used. These can control several sources of data at once and record large quantities of information at high processing speeds. The process computers at the DB's Saarbrucken operating control center are an example of the use of computers in railway signaling technology. [German]

Lenz, H Mueller, W *Elektronische Rechenanlagen* Vol. 20 No. 5, 1979, pp 242-249, 6 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany

06 302729
OPERATING CONTROL TECHNIQUES IN LOCAL RAIL TRAFFIC [Betriebsleittechnik im schienengebundenen Nahverkehr]
In short distance rail traffic, operating techniques play a major role in guaranteeing running safety and automating the network. The author describes the limits of existing possibilities and the tasks to be fulfilled and then gives details of a hierarchical system of process computers. He quotes the example of the system being installed in Hamburg. [German]

Sperl, H *Internationales Verkehrswesen* Vol. 31 No. 3, May 1979, pp 172-175, 6 Phot.

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

06 302731
ALGORITHMS FOR THE OPTIMUM CONTROL OF A TRAIN DERIVED FROM PONTRYAGIN'S PRINCIPLE OF THE MAXIMUM AND VERIFIED BY THE HYBRID SYSTEM
The problem to be solved in this case is train control in the vicinity of a junction in a railway network. The train has to be controlled during the approach to the common section of line. According to Pontryagin this is a fixed-time optimum control problem. Procedure at the approach has a mathematical form, which is the square of the derivative of kinetic energy. The mathematical algorithms, when solved by the hybrid system, have the form of partial differential equations based on the real data for the train and the line, and there may be restrictions in the train speed during the approach.

Janjanin, S *Rail International* Vol. 10 No. 7, July 1979, pp 638-642, 7 Phot., 6 Ref.

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

DOTL JC

06 303175
ADVANCED PASSENGER TRAIN SPEED ADVISORY SYSTEM BASED UPON MICROPROCESSORS
The Advanced Passenger Train (APT) has been designed to travel on existing tracks at speeds in excess of those permitted for the types of train in current service. This advance is made possible by several factors, including a tilt mechanism which ensures that passengers are not subjected to greater lateral forces than they currently experience, a better understanding of the dynamics of the wheel/rail interaction which has enabled the train suspension and wheel designs to be optimized for higher speed operation, lighter construction of the vehicles to reduce track forces and, to assist the driver of the APT in maintaining the correct speed at all times, a speed advisory system based on microprocessors. The software and hardware of the system are discussed.

Proceedings of the Conference on Microprocessors in Automation and Communications, University of Kent, Canterbury, England, September 19-22, 1978.

Parkman, WT (British Railways Board); Sutton, MS *Institution of Electronic & Radio Engineers, Proc* No. 41, 1978, pp 217-222

ACKNOWLEDGMENT: EI
ORDER FROM: Institution of Electronic and Radio Engineers, 9 Bedford Square, London WC2B 3RG, England

06 303177
USE OF MICROPROCESSORS IN AUTOMATIC TRAIN OPERATION
A speed calculating automatic train operating system is being developed. The use of microprocessors within this system is described. Particular reference is made to the failure of safety and availability and how these problems are met by the use of a two-out-of-three system.

Proceedings of the Conference on Microprocessors in Automation and Communications, University of Kent, Canterbury, England, September 19-22, 1978.

Keats, W (British Railways Board); Newing, DH *Institution of Electronic & Radio Engineers, Proc* No. 41, 1978, pp 207-216, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Institution of Electronic and Radio Engineers, 9 Bedford Square, London WC2B 3RG, England

06 303178
EXPERIMENTAL RAILWAY SIGNALLING SYSTEM USING MICROPROCESSORS
Conventional railway signalling technology has been developed to provide the railway operator with a system which is both extremely safe and acceptably reliable. Any radical departure from present methods, therefore, must be not only cost effective, but must be capable of being engineered to suitably high standards, and must meet the safety, reliability, and maintainability requirements. Within the constraint that it is desired to retain the basic form of present day railway signalling systems, a number of opportunities exist for the use of new technology. The work described in this paper is aimed at the replacement by modern electronic technology of the large part of the system concerned intimately with safety. There is no intention at this stage to propose changes to the appearance and behavior of the system as seen by the operating staff.

International Conference on Distrib Computer Control Systems, Birming-

ham, England, September 26-28, 1977.
Cribbens, AH (British Railways Board); Furniss, MJ Ryland, HA *Institution of Electrical Engineers, Conf Publ* No. 153, 1977, pp 157-162

ACKNOWLEDGMENT: EI
ORDER FROM: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

06 303188
SIGNALLING FOR THE VERY HIGH SPEED LINE
The subjects discussed in the paper contribute to the basic principles, the signaling program, the technical design of the signaling equipment, the switch and crossing work and its control and the central control station.

Weber, O (French National Railways) *French Railway Techniques* Vol. 21 No. 1, 1978, pp 45-57

ACKNOWLEDGMENT: EI
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DOTL JC

06 303192
MARSHALLING YARDS AND AUTOMATION EQUIPMENT FOR THEM
Subjects discussed deal with the general arrangement of a set of splitting and sorting sidings, switch characteristics, the switch operating mechanisms, the operating methods of manual and automatic control of switches, and the braking problems of the various types of brakes.

French Railway Techniques Vol. 21 No. 2, 1978, pp 149-157

ACKNOWLEDGMENT: EI
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DOTL JC

06 303255
SIGNAL INTERFERENCE EFFECTS WITH CHOPPER CONTROLLED TRACTION
Rapid transit and commuter services operated with direct current usually have ac signaling systems that can be adversely affected by chopper propulsion controls that permit regeneration and reduce power consumption. Magnetic or conductive interference mechanisms are now well understood and it should be possible to write a specification that meets signal requirements without excessive increases in costs of propulsion equipment on the train. Tests by London Transport confirm that the solution lies in specifying an adequate input filter, together with fail-safe control and monitoring of frequencies generated by the chopper.

Mellitt, B (Birmingham University, England) *Railway Gazette International* Vol. 135 No. 11, Nov. 1979, pp 999-003, 5 Fig., 1 Tab., 7 Ref.

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06 303256
COMPUTERS CAN NOW PERFORM VITAL FUNCTIONS SAFELY
Early attempts to apply data processors to tasks previously reserved for vital relays concentrated on redundancy and voting systems as protection against hardware failure. When logic performed by fail-safe relays, with predictable failure modes, is replaced by computers with unpredictable failure modes, several factors must be considered. Not enough attention was devoted to software with the computers and no complex program can be considered foolproof even after a lengthy period in service. L. M. Ericsson utilizes parallel running of non-identical programs with multi-stage comparison to guard against failures. This technique has been applied to large interlockings and to on-train signaling and speed-control systems. Ahead is the possibility that the functions of logic and output checking may be carried out within a single microprocessor, using fault-tolerant programming.

Linde, OB von (Ericsson (LM), Sweden) *Railway Gazette International* Vol. 135 No. 11, Nov. 1979, p 1004, 3 Fig., 2 Phot.

ORDER FROM: ESL

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06 303257
SIGNALLING STRATEGY FORESHADOWS RENEWED ATTACK ON HIGH-SPEEDS
Italian State Railways will adapt its existing signaling to permit speeds to be raised to 250 km/h and eventually to 300 km/h on the Rome-Florence high-speed line. Presently the aim is to supplement additional lineside signal aspects with more elaborate cab signaling. Required track circuits have been installed on a section of the high-speed line with performance evaluation currently being evaluated.

Railway Gazette International Vol. 135 No. 11, Nov. 1979, p 1007, 1 Fig., 1 Tab., 4 Phot.

ORDER FROM: ESL

DOTL JC

06 303632
FAIL-SAFE DIGITAL TRANSMISSION OF THE SIGNALLING INFORMATION
With the object of increasing the reliability of the transmission system, JNR have developed digital equipment for transmission of signalling information with a high safety level, to replace the existing system on the Shinkansen line.

Yokota, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 87-88, 1 Tab., 3 Phot.

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

DOTL JC

06 303855
SERVICE APPLICATION IN BRITAIN OF OPTICAL-FIBRES CABLE TELEPHONE LINKS
BR and LTE install GEC equipment over some 7 km on electrified lines to evaluate service performance. Many advantages including immunity from interference from traction units operating with solid-state control and ability to adopt very lengthy repeater spacings.

Rail Engineering International Vol. 8 No. 2, Apr. 1979, pp 63-64

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

06 304421
MARKET DEFINITION STUDIES FOR PHOTOVOLTAIC HIGHWAY APPLICATIONS
Prospects for solar electric power are examined in applications related to highways within the continental United States. Principal prospective users are found to be the highway department of the various states. Economic analysis is employed to demonstrate that suitable applications can occur when powering apparatus such as signs, crossing signals, or instruments which consume less than 100 watts on the average, provided they are located at least one-half mile from existing utility power. Such applications are projected to occur two or three times per state per year. Attitudes of highway officials toward possible use of solar power are sampled and described. Although falling photovoltaic cell prices are expected to have little effect on sales potential here, methods for federal stimulation of this market are discussed. (ERA citation 04:036039)

National Aeronautics and Space Administration, Department of Energy NASA-CR-159477, Dec. 1978, 124 p.

Contract EX-76-A-29-1022

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DOE/NASA/0040-78/1

06 304440
PHOTOVOLTAIC POWER SYSTEMS MARKET IDENTIFICATION AND ANALYSIS. FINAL REPORT, JANUARY 1977--FEBRUARY 1978
This report summarizes the work done by InterTechnology/Solar Corporation, its consultants, Mobil Tyco Solar Energy Corporation and the University of Delaware Institute for Energy Conversion, and its consultants, during the marketing analysis of near and intermediate term photovoltaic power applications. To obtain estimates of the domestic and foreign market potential for photovoltaically powered devices two approaches were used. First, the study was identifying then screening all possible photovoltaic power supply applications. This approach encompassed the first two tasks of the study: (1) a survey of the current uses of photovoltaic systems, both domestic and international, and a projection of the usage of those systems into the future; and (2) a new idea generation task which attempted to come up with new ways of using photovoltaic power. Second, the study required

in-depth analysis of key near-term and intermediate-term photovoltaic applications identified during the first phase to obtain reasonable estimates of photovoltaic market potential. This process encompassed the third and fourth tasks of the analysis: (3) refinement of ideas generated in Task 2 so that certain products/applications could be identified, the product defined and a market survey carried out; and (4) development of a detailed product scenario which forecasts sales, barriers to market acceptance, and technical innovations required for proper introduction of the products. The work performed and findings of each task are presented.

InterTechnology/Solar Corporation, Department of Energy May 1979, 550 p.

Contract EG-77-C-01-4022

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

HCP/T4022-01

06 304444
LOS ALAMOS SCIENTIFIC LABORATORY ELECTRONIC VEHICLE IDENTIFICATION SYSTEM
A three-digit electronic identification system is described. Digits may be decimal (1000 combinations) or hexidecimal (8192 combinations). Battery powered transponders are interrogated with a low-power (1 W) radio signal. Line-of-sight interrogations up to 33 m (100 ft) are possible. Successful interrogations up to 7 m (20 ft) are possible for concealed transponders (that is, in the engine compartment). Vehicles moving at high rates of speed can be interrogated. This system provides data in a computer-compatible RS232 format. The system can be used for other applications with little or no modification. A similar system is in present use for identification and temperature monitoring of livestock. No unforeseen problems exist for expanding the coding scheme to identify larger numbers of objects.

Landt, JA Bobbett, RE Koelle, AR Salazar, PH
Los Alamos Scientific Laboratory, Department of Energy May 1979, 21 p.

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

LA-7818-MS

06 307671
AUTOMATIC TRAIN DRIVING: THE JEUMONT-SCHNEIDER SYSTEM
No Abstract.

Chapront, P *Railway Engineer International* Vol. 4 No. 5, Sept. 1979, pp 55-58, 5 Fig., 5 Phot.

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

DOTL JC

06 308263
EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY, TASK 2 STATUS OF PRESENT SIGNAL/CONTROL EQUIPMENT
This report presents the status of present signal/control equipment in service on passenger rail routes in the United States and in foreign countries. It also provides an evaluation comparison of the features of signal and control Systems currently used by selected domestic and foreign major operating railroad/transit systems. The report was developed from a literature review, visits to domestic and foreign railroads, discussions with railroad signal engineers, transportation personnel and from data gathered from domestic and foreign railroad/transit systems.

Taylor, SF Marshall, JF Schultz, CM Whalen, RB
STV, Incorporated, Kentron International, Incorporated, Dyer (Thomas K), Incorporated, Federal Railroad Administration Final Rpt. FRA-/ORD-78/39.2, Jan. 1979, 122 p., Figs., 1 App.

Contract DOT-FR-773-4236

ORDER FROM: NTIS

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06 308285
THE ACR 500 RETARDER RADAR [Der Gleisbremsradar ACR 500]
In automated marshalling yards, the speed of cars being sorted must be measured. Continuous-wave Doppler radars are particularly suitable for this technique. One of these devices is in service in Zurich-Limmattal marshalling yard. Its construction and operation are briefly described. [German]

Arnold, W *Siemens-Albis Berichte* Vol. 31 No. 2, 1979, pp 70-73, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Siemens-Albis, Albisriederstrasse 245, 8047 Zurich, Switzerland

06 308291
CTC AND COMTRAC OF SHINKANSEN
Central Traffic Control (CTC) covers the whole of the Shinkansen lines. The center is located in Tokyo Station and controls the routes to all stations. In 1964, when the Shinkansen was opened to traffic, route control was carried out by train dispatchers. Since 1972 however, computer-assisted route control and train traffic control has been in operation. The article describes the system, called COMTRAC.

Ebihara, K *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 23-24, 1 Fig., 1 Tab., 1 Phot.

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

DOTL JC

06 308292
SAFETY AND ATC OF SHINKANSEN
Train speed was previously controlled by the wayside signal. But the high speeds on the Shinkansen line made this safety system dangerous, as the train is running too fast to see the signal, and moreover cannot slow down immediately. Trains are therefore operated by means of a single signal inside the cab, which indicates the speed at which the train must run, and operates the train automatically, although the driver has manual control of certain operations such as speeding up and stopping in stations. The article explains the reasons why JNR adopted ATC for the Shinkansen line, and also how it functions.

Yamanouchi, S *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 25-27, 2 Fig., 1 Tab., 3 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

06 308297
USE AND PROFITABILITY OF CENTRALIZING RAILWAY TRAFFIC CONTROL SYSTEMS [Potrzeba i efektywnosc eksploatacyjna centralizacji funkcji prowadzenia ruchu]
The article discusses the effect of technical progress on the centralization of rail traffic control and shows the main requirements with respect to the operation of such installations. [Polish]

Smolarz, W *Problemy Kolejnictwa* No. 84, 1979, pp 7-29

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Problemy Kolejnictwa, Warsaw, Poland

06 308302
TRAIN MONITORING SYSTEM AT PARIS-NORD [Systeme de suivi des trains de Paris-Nord]
Description and explanation of how the Paris-Nord train monitoring system which handles more than 2200 train movements each day works. The system is modular and is designed to make any extensions later required easy to introduce. It will be a great advantage when the RATP-SNCF interconnection scheduled for 1982 occurs. [French]

Yerebakanian, L *Revue Generale des Chemins de Fer* Oct. 1979, pp 495-506, 5 Phot.

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

DOTL JC

06 308447
THYSSEN SHUNTING EQUIPMENT FOR THE AUTOMATION OF CLASSIFICATION YARDS [Thyssen Rangiertechnik fuer die Automatisierung des Ablaufbetriebs]

A description is presented of the current systems for automatic control of cars in marshalling yards by actuating the rail-mounted braking devices, used in Switzerland and Federal Republic of Germany. [German]

Meuters, G *Thyssen Technische Berichte* Vol. 11 No. 1, 1979, pp 30-40, 8 Ref.

ORDER FROM: ESL

07 191734
EFFECTS OF THE RIDE ENVIRONMENT ON PASSENGER ACTIVITIES: A FIELD STUDY ON INTERCITY TRAINS
A three-part field study of passenger activities (e.g. reading, writing, talking, sleeping) was conducted on intercity Amtrak trains in the northeastern United States to determine the relationships between the ride environment, subjective passenger comfort and satisfaction, and overt passenger behavior. From observations of 7000 revenue passengers over a one-year period, a stable relative frequency distribution of 12 categories of passenger activity in three effort classes was established. Reading and viewing were observed most often; handcrafts and games were seldom observed. An Amtrak survey of ride quality and activity preferences was also conducted using over 800 revenue Northeast Corridor passengers. Although passengers rated the ride as comfortable, ride motions were perceived to interfere with performance of visual/motor tasks (e.g., Reading and Writing). Passengers' preferences for activities were also found to increase with trip distance. In order to quantify ride quality/activity relationships, observations of passenger activity were made simultaneously with measurements of vibration in six degrees of freedom, acoustic noise, temperature, relative humidity, and illumination aboard 77 Amtrak vehicles. Correlational analysis revealed that rotational (rather than linear) motions were associated with low frequencies of motor and conversational activity and high levels of rest behavior. Activity levels also varied with vehicle type and time of day. Multiple regression techniques were used to develop linear equations of physical ride quality and trip variables which account for 20% of the variance in the relative frequencies of various types of activities.

Wichansky, AM
Transportation Systems Center Final Rpt. DOT-TSC-RSPA-79-1, Jan. 1979, 351 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293389/3ST

07 192056
ACCESS TO THE ENVIRONMENT. VOLUME 3: APPENDICES: DOMESTIC AND INTERNATIONAL EXAMPLES OF LEGISLATION, GUIDELINES, STANDARDS AND CRITERIA, BIBLIOGRAPHY, LISTING OF PEOPLE AND ORGANIZATIONS CONTACTED, LOCATIONS OF BARRIER FREE SITES AND GLOSSARY OF TERMS
This third volume in a series of three reference documents for landscape architects and designers presents domestic and international examples of legislation, guidelines, standards and criteria for constructing and redesigning buildings to make them barrier free and therefore accessible to handicapped and disabled persons. Examples are included of Federal, state, and local laws and guidelines, as well as British, Canadian, and Dutch legislation and standards. Specifications for doorways, walkways, sign levels, ramps, rails, elevators, restrooms facilities, public telephones, lighting, floor surfaces, parking areas, buses and trains, and drinking fountains are presented. A list of people and organizations contacted in composing the volumes is provided, as well as a list of locations of barrier-free sites that were discussed in volume 2. A bibliography and glossary of terms is appended.

Also available in set of 3 reports PC E13, PB-290 800-SET.

Robinette, GO
American Society of Landscape Architects Found, Department of Housing and Urban Development, Architectural & Transport Barriers Compliance Bd July 1976, 651 p.

Contract HUD-H-2002-R

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-290803/6ST

07 198141
REPORT TO THE PRESIDENT AND TO THE CONGRESS OF THE UNITED STATES BY THE ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD
The 1968 Architectural Barriers Act requires federally funded facilities to be accessible to and usable by physically handicapped persons. Congress established the Architectural and Transportation Barrier Compliance Board in 1973 to ensure compliance with the standards of the Act. This second annual report details the efforts to comply with the law by the nine Federal agencies which make comprise the Board: the Departments of Health, Education, and Welfare; Transportation; Housing and Urban Development; Labor; Interior; and Defense; the General Services Administration; the Veterans Administration; and the Postal Service. The text describes the Board's background, planning, and activities, and contains progress reports from each agency. Appendices include: the minutes of the Board's 1973 meeting; reports on the housing, transportation, and public accessibility needs of the handicapped; a technical handbook for a facilities and engineering and construction manual; a discussion of laws relating to the Board's mandate; and varied proposals by member agencies to implement the Board's goal of architectural accessibility for the handicapped. A flow chart depicts the Bureau of Land Management's internal compliance procedures, and floor plans and drawings illustrate accessibility strategies.

Executive Summary available from PROJECT SHARE, P.O. Box 2309, Rockville, Md. 20852 as SHR-0002509/ES.

Architectural & Transport Barriers Compliance Bd Nov. 1975, 265 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

SHR-0002509

07 301576
LOCOMOTIVE ENGINEER TRAINING: STATE OF THE ART
A training program developed by the Santa Fe Railway to train individuals for the position of locomotive engineer on today's railroads is described. The program uses the traditional method of the fireman-engineer relationship in conjunction with classroom instruction and locomotive and train simulation. Its ultimate objective is to produce people who have the best possible qualifications to operate locomotives and handle trains safely and efficiently. The Santa Fe Railway feels that standardization of instruction is the key to reaching this goal and that centralized training and the use of simulation have proved to be the best way to achieve standardization. /Author/

This paper appeared in Transportation Research Record No. 706, Simulation Technology and Traffic Accident Records Systems.

Mecaskey, JR (Santa-Fe Railway) *Transportation Research Record* No. 706, 1979, pp 5-8

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07 301720
ANNUAL REPORT OF THE LIAISON COMMITTEE FOR THE CARRIAGE OF DISABLED PERSONS [Rapport annuel du Comite de Liaison pour le transport des personnes handicapees]
The problems of proving transport for the disabled are described and details given of the legal aspects of efforts made by the public authorities. The results of work by the COLITRAH are listed: criteria governing access to public transport systems, rail transport, vehicles for the disabled, air transport, other public transport and private cars. [French]

Conseil Superieur des Transports SNCF Cat 26 N42, Mar. 1979, 110 p., Tabs.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Conseil Superieur des Transports, 55-57 Avenue Kleber, 75784 Paris Cedex 16, France

07 301809
HUMAN ENGINEERING CONTRIBUTIONS TO THE DEVELOPMENT OF A RAIL PASSENGER SEAT
The Transport Canada Research and Development Centre has undertaken to develop an improved rail pasenger seat as part of an overall program to improve rail passenger service in Canada. DCIEM has contributed to the seat development project by providing expertise in areas of human engineering. This report describes some of the work undertaken to support the development of the seat. The main body of the report focuses on the laboratory comparative evaluation of the prototype seat and a close competitor.

Noy, I Crabtree, B
Defence and Civil Inst of Environmental Med, Can, Transport Canada Research and Development Centre DCIEM 78X45, TP 1784, Nov. 1978, 58 p., Figs., Tabs., Refs.

ORDER FROM: Defence and Civil Inst of Environmental Med, Can, 1133 Sheppard Avenue West, P.O. Box 2000, Downsview, Ontario M3M 3B9, Canada

07 301830
PROVISION OF TRANSPORT FOR THE HANDICAPPED
A number of publications are reviewed dealing with the problems of, and the provision of transport for, individuals with mobility handicaps. These demonstrate that much has been done, but a great deal more remains to be accomplished. Even the basic question of whether to provide fully accessible transport for the handicapped, or construct special systems designed to meet their mobility needs, remains unresolved in most countries. A review of the alternative methods of meeting the transport needs of the handicapped suggests that in certain modes, particularly walking, the designer could substantially improve the mobility of the disabled. By contrast, the design of specialized systems may not be cost effective, partly because the physically disabled do not constitute a uniform user group. However, the greatest difficulty is seen to rest with the expensive modification of existing transport systems. Progress in this field is expected to be slow and vary between different countries, but continuous, largely in response to pressure from activist groups.

First Transport Ergonomics Conference held February 1978, Birmingham, England.

Ashford, NJ (Loughborough University of Technology, England) *Ergonomics* Vol. 22 No. 2, Feb. 1979, pp 189-197, 24 Ref.

ACKNOWLEDGMENT: EI
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07 301832
ROLE OF PSYCHOLOGY IN THE DESIGN AND EVALUATION OF TRANSPORT SYSTEMS
The aim of this paper is to make some observations, practical and theoretical, on the role of psychology in the design and evaluation of transport systems. "Transport systems" is taken to mean not only the hardware of vehicle components, passenger terminals and the environment in which the system is to operate, but also the practices and procedures demanded of vehicle operators and passengers. It is suggested that the psychologist's knowledge of, say, the perceptual and motor performance of human beings and of the practical aspects of survey methodology are at a level rigorous enough to make valuable contributions in man-machine systems design and evaluation. Nevertheless the precise prediction and measurement of, for example, affective states and of information-processing and decision-making performance seems beyond the scope of current theory. This limits the quantitative power and hence the usefulness of psychology to transport system designers at present. Some reasons are offered for these limitations and the future role of psychology in the design and evaluation of transport systems is discussed.

Galer, IAR (Loughborough University of Technology, England) *Ergonomics* Vol. 22 No. 2, Feb. 1979, pp 129-133, 7 Ref.

ACKNOWLEDGMENT: EI
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07 302261
PROCEEDINGS OF THE THIRD UMTA R&D PRIORITIES CONFERENCE, CAMBRIDGE, MASSACHUSETTS, NOVEMBER 1978. VOLUME VIII: ACCESS FOR ELDERLY AND HANDICAPPED PERSONS WORKSHOPS
This is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshops on Access for Elderly and Handicapped Persons. Part I deals with planning and regulation and includes discussions of transportation problems of handicapped people and transportation policies and practices as they affect handicapped people. Part II, demonstrations and hardware, includes discussions of concepts under development in the area of transportation for the elderly and handicapped hardware research and development to improve transit for elderly and handicapped travellers, and a critique of research concerning transportation for the elderly and handicapped. This volume contains five resource papers which are summarized in Volume I of this multi-volume work along with summaries of other workshop sessions. Volume I also includes the proceedings of the general sessions and a listing of conference participants. These proceedings (Rpt. Nos. UMTA-DC-06-0157-79-1 thru UMTA-DC-06-0157-79-9) consist of nine separately titled volumes, namely: Volume I: Proceedings of General Sessions and Summarized Reports of Workshops; Volume II: Bus and Paratransit Technology Workshops; Volume III: AGT and Advanced Systems Workshops; Volume IV: Service and Methods Demonstration Workshops; Volume V: UMTA Special Technology Programs Workshops; Volume VI: Rail and Construction Technology; Volume VII: Transit Management Workshops; Volume VIII: Access for Elderly and Handicapped Persons Workshops; and Volume IX: Urban Transportation Planning Workshop.

This report is a sequel to reports: Proceedings of the UMTA/APTA R&D Priorities Conference, February 1978 (PB 255-898); and Proceedings of the Second R&D Priorities Conference, December 1976 (PB 266-158).

American Public Transit Association, Urban Mass Transportation Administration, (DC-06-0157) UMTA-DC-06-0157-79-8, Nov. 1978, 50 p.

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PB-300993

07 303076
IMPLICATIONS OF FUEL-EFFICIENT VEHICLES ON RIDE QUALITY AND PASSENGER ACCEPTANCE: WORKSHOP PROCEEDINGS WOODS HOLE, MASSACHUSETTS, SEPTEMBER 6-8, 1978
Four workshops were conducted under the auspices of the Transportation Research Board. The topics of discussion included ride quality and passenger acceptance problems associated with enhanced fuel efficiency of automobiles (Group A) and aircraft (Group B); shifts in intermediate range (100-500 miles) travel for automobiles to public transit (Group C); and implications of increased size disparity for ground transport freight and passenger vehicles using shared guideways (Group D). In each group, major problem areas were identified and strategies for conducting pertinent research were outlined. A glossary of technical terms and a list of workshop participants are also included in the report.

Wichansky, AM Kuhlthau, AR (Virginia University) Transportation Systems Center, Department of Transportation, Langley Research Center, (DTS-532) Final Rpt. DOT-TSC-RSPA-79-21, NASA CP-2096, Aug. 1979, 118 p., Figs., Tabs., Refs., Apps.

ORDER FROM: NTIS

07 303619
PSYCHOLOGICAL STUDIES INTO THE CAPABILITIES REQUIRED OF STAFF EMPLOYED BY DR AS TRAFFIC CONTROLLERS IN PARTICULAR IN THE CASE OF DECISION MAKING [Ueber Untersuchungen zur Aforderungsstruktur und Handlungsregulation zur Beanspruchungen und Belastungswirkungen auf Dispatcherarbeitsplaetzen der Deutschen Reichsbahn]
No Abstract. [German]

Schenk, S *Verkehrsmedizin* Vol. 26 No. 3, 1979, pp 89-113, 12 Tab., 9 Phot., 36 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13/14, Postfach 1235, 108 Berlin, East Germany

07 303645
EVALUATION OF ADDITIONAL COSTS FOR MAKING PUBLIC TRANSPORTATION ACCESSIBLE TO THE HANDICAPPED
The study made in the Federal Republic of Germany is described. The study deals with possible measures for handicapped persons in public transport systems, an estimation of costs and the possibilities of realization.

Blennemann, F Pajonk, E *Transportation Planning and Technology* Vol. 5 No. 2, 1979, pp 105-114

ACKNOWLEDGMENT: EI
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07 304642
A METHODOLOGY FOR EVALUATING THE EFFECTIVENESS OF TRANSPORTATION IMPROVEMENTS FOR THE ELDERLY AND HANDICAPPED
The research project is a study dealing with the evaluation of transportation services from the viewpoint of the elderly and handicapped users. The objective of the research is to develop a cost-effectiveness methodology for evaluating existing services and transportaton improvements; and to develop suggested service design standards for different types of handicap severity.

The transportation services considered are the City Transit System (bus and subway); taxi service; EASYRIDE service; and the ambulette service.

Falcocchio, J
Polytechnic Institute of New York, Department of Transportation Final Rpt. TR-78/503, DOT/RSPA/DPB/50-79/2, June 1979, 111 p.

Contract DOT-OS-70084

ACKNOWLEDGMENT: NTIS
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PB-300440/5ST

07 307674
PROTECTION OF THE HEALTH AND SAFETY AT WORK WHEN USING SYNTHETIC MATERIALS ON THE RAILWAY
[Protection de la sante et securite du travail des agents des chemins de fer utilisant les matieres plastiques]
No Abstract. [French]
Also in English and German.

International Union of Railway Medical Services UIC Cat 17 N 11, 1979, 38 p., Tabs., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: International Union of Railway Medical Services, 85 rue de France, 1070 Brussels, Belgium

07 308304
PASSENGER ENVIRONMENT
A review of the factors, such as thermal comfort, noise, vibration, lighting and seating which affect passenger environment, with particular emphasis on passenger vehicles.

Batchelor, GH *Institution of Mechanical Engineers Proceedings* Vol. 193 No. 40, 1979, pp 407-414, 5 Phot.

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

DOTL JC

08 300324
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, A NATIONAL STANDARD FOR APPLICATION ON ALL CLASSES OF HIGHWAYS
This 1978 update of the previous Manual, 1971, includes all official revisions which have been made in the earlier Manual by the National Advisory Committee on the Manual and approved by the Federal Highway Administrator. It includes the traffic control devices--signs, signals, markings and other devices--placed on or adjacent to a street or highway by authority of a public body or official having jurisdiction to regulate, warn or guide motor vehicle traffic. The Manual has been approved by the Federal Highway Administrator as the National Standard for all Highways open to public travel in accordance with Federal Regulations. It is also approved as an American National Standard by the American National Standards Institute. /Author/

See also the 1971 Edition, TRIS 141724 and Part VIII of 1978 Edition, TRIS 300325.

Federal Highway Administration 1978, n.p.

ORDER FROM: GPO

08 300325
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS--PART VIII-TRAFFIC CONTROL SYSTEMS FOR RAILROAD-HIGHWAY GRADE CROSSINGS
This section of the complete MUTCD includes all authorized traffic control devices and systems which regulate, warn or guide highway traffic at highway-railroad grade crossings. This National Standard covers the following topics relative to Traffic Control Systems at such locations and is divided in four main sections: 1. General: Functions; Use of Standard Devices; Uniform Provisions; Crossing Closure; Traffic Controls During Construction and Maintenance. 2. Signs and Markings: Purpose; Railroad Crossings Sign; Railroad Advance Warning Sign; Pavement Markings; Illumination at Grade Crossings; Exempt Crossing Signs; Turn Restrictions; Do Not Stop on Track Signs. 3. Signals and Gates: Purpose and Meaning; Flashing Light Signal--Post Mounted; Flashing Light Signal--Cantilever Supported; Automatic Gate; Train Detection; Traffic Signals at or Near Grade Crossings; Component Details. 4. Systems and Devices: Selection of Systems and Devices.

See also 1971 Edition, TRIS 141724 and 1978 Edition, TRIS 300324.

Federal Highway Administration 1978, n.p.

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08 300355
DRIVERS' DUTIES AT RAILROAD GRADE CROSSINGS
This commentary reviews state motor vehicle and traffic laws applicable to railroad grade crossings. It is limited to provisions appearing in state vehicle codes and does not include laws appearing in state codes relating to highways or railroads. It reflects laws that were in effect on January 1, 1978. Agreement with and divergence from the Uniform Vehicle Code provisions by each of the states are detailed. Volume includes a summary and observations.

Kearney, EF (National Committee on Uniform Traf Laws & Ordinanc) *Traffic Laws Commentary* Vol. 8 No. 1, Jan. 1979, 79 p.

Contract DOT-HS-5-01121

ORDER FROM: GPO

08 300546
RAIL-HIGHWAY GRADE CROSSING WARNING SYSTEMS--EQUIPMENT AND APPLICATION
Booklet prepared by RPI Task Force of Subcommittee on Grade Crossing Safety in conjunction with seminars for state transportation departments discusses the following: History and review of rail-highway crossing warning systems and genesis of standard specifications; Wayside and control equipment for warning systems; Applications of rail-highway warning equipment; Priority determination of applications and applicable procedures; Grade crossing surfaces; AAR Signal Manual--Part 194; AAR Bulletin No. 7; Typical hazard index formula.

AREA Bulletin Proceeding Vol. 79 No. 665, Nov. 1977, n.p.

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08 300551
SYMPOSIUM--MATERIALS FOR GRADE CROSSINGS
This session included four presentations on grade crossing surfaces: Plastics by M. Curati; Rubber by A. Dumm; Wood by E. E. Dailey; and concrete by R. S. Baker. Characteristics of the various products and installations are discussed.

Proceedings of the Ninetieth Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 18-20, 1978, Chicago, Illinois.

Curati, M (True Temper); Dumm, A (Goodyear Tire and Rubber Company); Dailey, E (Koppers Company); Baker, RS (R.B. Industries)
Roadmasters' & Maintenance of Way Assn of America 1978, pp 22-32

ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

08 300667
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
The principles of tort liability apply generally, whether the case is one of design, maintenance, or construction. All case principles are, therefore, applicable and lessons may be learned from nonconstruction zone cases. In another sense, however, construction zones present special problems in that they are at variance with the motorist's normal expectations. Thus, adequate warning devices and barrier safeguards are required. The question of adequacy in tort law discussion usually takes place in the negative, which further complicates the subject. That is to say, most of the cases discuss what is not adequate; what is adequate remains a vague item in terms of legal discussion. In light of this, this paper discusses some general principles, some considerations involving federal regulations or programs, and some recent cases that provide first-hand knowledge of judicial treatment of the topic at hand. /Author/

This paper appeared in TRB Research Record No. 693, Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials.

Oliver, DC (Federal Highway Administration) *Transportation Research Record* No. 693, 1978, pp 47-51

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DOTL JC

08 301316
TRAFFIC ENGINEERING FOR LIGHT-RAIL TRANSIT
The development of safe and operationally effective designs for at-grade interactions and crossings for light-rail transit (LRT) is an issue central to the future deployment of the mode. This paper describes a design approach based on the performance characteristics of light-rail vehicles (LRVs) and the application of conventional traffic engineering hardware and design practice. At-grade operation of LRT introduces potential conflicts with motor vehicles and pedestrians at intersections, in streets between intersections, and at mid-block crossings. These conflicts are a source of delay and accidents for LRVs. Application of the appropriate conflict-control techniques must consider that modern LRVs have performance characteristics essentially similar to those of transit buses. There are four strategies available to the traffic engineer to eliminate or control points of conflict among LRVs, motor vehicles, and pedestrians: at-grade separation of traffic flows in space, vertical separation of traffic flows in space, separation of traffic flows in time, and reduction in the number of traffic approaches. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Korve, HW (De Leuw, Cather and Company) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 107-115, 11 Fig., 2 Ref.

ORDER FROM: TRB Publications Off

08 302149
AUTOMOBILE-TRAIN GRADE CROSSING COLLISIONS: AN EVOLVING THEORY OF LIABILITY
Concern over the rising toll in life and limb exacted by rail-grade crossing collisions crystallized on the national level with the enactment of the Federal Railroad Safety Act of 1970 which directed the Secretary of Transportation to investigate and recommend solutions with respect to safety problems at

such crossings. The Highway Safety Act of 1973 provided, inter alia, for the infusion of massive federal funding to assist in the upgrading of protective devices at certain rail-grade crossings. The paper reviews, from the plaintiffs' perspective, the traditional theories of liability advanced against a railroad company by a non-railroad employee motorist and defenses interposed thereto, and explains in detail the evolution of a cause of action, kindred to that employed in product liability actions, which is premised on engineering and design deficiencies in the protective devices emplaced at railroad-grade crossings.

Motley, RL (Blatt & Fales) *Journal of Products Liability* Vol. 2 No. 4, 1978, pp 253-266, Refs.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

08 302172
MISSOURI BEGINS DRIVE AGAINST UNSAFE RAILROAD CROSSINGS THROUGHOUT THE STATE
A program designed to make all railroad crossings in Missouri safer in both rural and urban areas has been announced by State Highway Department. The new safety program is the outgrowth of a 1978 survey of locations in the state where streets and roads cross railroad line. All crossings will be given basic improvements, but flashing lights and other more extensive protection will be provided those topping the danger list.

Better Roads Vol. 49 No. 4, Apr. 1979, p 18

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

08 303169
LEGAL EFFECTS OF USE OF INNOVATIVE EQUIPMENT AT RAILROAD-HIGHWAY GRADE CROSSINGS ON RAILROAD'S ACCIDENT LIABILITY
This report discusses the effect on a railroad's legal liability for railroad-highway grade crossing accident costs when that railroad uses innovative grade crossing safety equipment. Its purpose is to evaluate the assertion that a railroad's use of innovative warning device technology increases the likelihood that the railroad will be held liable for accidents at that (or other) crossings. The methodology employed in carrying out this research involved the identification and analysis of relevant federal and state court decisions. Three significant conclusions resulted from this study. First, railroads do not necessarily increase their legal liability for grade crossing accident costs by deploying innovative grade crossing warning equipment. Second, railroads should carefully monitor government and industry activities demonstrating the feasibility of new warning equipment because such activities may affect their liability exposure. Finally, railroads may deploy new technology at a particular rail-highway crossing in response to accidents at that site without significant adverse effect on their position in relevant litigation.

Glater, DS Mond, TK
Transportation Systems Center, Federal Railroad Administration Final Rpt. FRA-RRS-80-01, DOT-TSC-FRA-79-19, Oct. 1979, 52 p., 64 Ref.

ORDER FROM: NTIS

DOTL RP

08 307660
RAILROAD-HIGHWAY GRADE CROSSING SURFACES. IMPLEMENTATION PACKAGE 79-8
This Technology Sharing Report sets forth pertinent information on currently available types of grade crossing surfaces as an aid in choosing physically and economically suitable surfaces for individual crossing or groups of crossing to be installed or improved. Trade names and manufacturers' identification are solely for convenience of the user and not endorsements by DOT. Crossing surface products from 22 suppliers and soil stabilization fabrics from 12 manufacturers are discussed.

Headley, WJ
Federal Highway Administration FHWA-IP-79-8, Aug. 1979, pp 1-51, 3 Tab., 1 App.

ORDER FROM: GPO

08 307664
MODERN GRADE CROSSINGS: THE TREND TODAY AND ITS APPLICATION ON ONE ROAD
As the grade crossing has evolved into a highly engineered structure featuring filter fabrics, and sturdy track structures, Elgin, Joliet and Eastern has been installing various types of new crossing surfaces to evaluate their relative merits in service. This article describes installation of a Semperit-Bodan precast concrete crossing, one of six non-conventional surfaces now being tested experimentally by the railroad.

Railway Track and Structures Vol. 75 No. 12, Dec. 1979, p 63, 4 Phot.

ORDER FROM: ESL

DOTL JC

09 197758
A CRITICAL EXAMINATION OF A NUMERICAL FRACTURE DYNAMIC CODE
After upgrading the energy dissipation algorithm, numerical experiments were conducted to assess the reliability of the explicit dynamic finite element code, HCRACK. Two dynamic fracture specimens, i.e., the wedge-loaded rectangular DCB (RDCB) specimen and the wedge-loaded tapered DCB (TDCB) specimen, were then analyzed with this updated fracture dynamic code. Using the experimentally determined dynamic fracture toughness, K sub ID, versus crack velocity, a-dot, relation, the RDCB specimen was analyzed first by the "propagation method" where good agreements between calculated and measured K sub ID versus a relation were observed. The calculated a versus time, t, relation was then used as input data in the "generation method" where the resultant K sub ID were virtually identical to those obtained in the propagation method. Error analyses of the generation method were also made first by using the experimentally determined a versus t relation and secondly by artifically perturbing this relation. A TDCB specimen was then analyzed with both the propagation and generation methods by using the K sub ID versus a-dot relation established for this specimen and the measured a versus t relation, respectively. The computed K sub ID obtained by both methods were good agreement with the experimental results, showing that either approach can be used in analyzing fracture.

Hodulak, L Kobayshi, AS Emery, AF
Washington University, Seattle Tech Rpt. TR-34, Feb. 1979, 30 p.

Contract N00014-76-C-0060

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A065093/7ST

09 197954
DEFINITION OF MUTUALLY OPTIMUM NDI AND PROOF TEST CRITERIA FOR 2219 ALUMINUM PRESSURE VESSELS. VOLUME 3: APPLICATIONS TO RAIL DEFECT EVALUATION
The technique for inspection of railroad rails containing transverse fissure defects was discussed. Both pulse-echo and pitch-catch inspection techniques were used. The pulse-echo technique results suggest that a multiple-scan approach using varying angles of inclination, three-surface scanning, and dual-direction traversing may offer promise of characterization of transverse defects. Because each scan is likely to produce a reflection indicating only a portion of the defect, summing of the individual reflections must be used to obtain a reasonably complete characterization of the defect. The ability of the collimated pitch-catch technique to detect relatively small amounts of flaw growth was shown. The method has a problem in characterizing the portions of the defect near the top surface or web intersection. The work performed was a preliminary evaluation of the prospects for automated mapping of rail flaws.

Schwartzberg, FR Toth, CJ King, RG Todd, PH
Martin Merietta Aerospace NASA-CR-135447, Feb. 1979, 35 p.

Contract NAS3-17790

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N79-21412/8ST

09 197966
AUTOMATED GAIN CONTROL IN RAIL FLAW DETECTION
The patent application relates to automated gain control in rail flaw detection which includes attenuation of echoes from rails pulsed with a burst of sonic energy, comparing said attenuated signals over discrete intervals, and reducing or increasing said attenuation in response thereto to develop a uniform signal from which an evaluation of flaw indicating echoes can be obtained.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Rudis, RP Ceccon, HL
Department of Transportation DOT-TSC-10121, Patent Application, No Date, n.p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293175/6ST

09 198483
CONCRETE POLYMER COMPOSITES (CITATIONS FROM THE NTIS DATA BASE)
These federally-sponsored research reports cover the production, hardening, uses, and properties of concrete polymer composites. Major potential applications include piping, building panels, bridge decking, distillation vessels, and tunnel supports. Both polymer aggregate concretes and polymer impregnated portland cement concretes are cited. (This updated bibliography contains 242 abstracts, 44 of which are new entries to the previous edition.)

Habercom, GE, Jr
National Technical Information Service July 1979, 248 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0627/4ST

09 198501
FINITE ELEMENTS IN STRUCTURAL ANALYSIS. VOLUME 2. JULY, 1977-JUNE, 1979 (A BIBLIOGRAPHY WITH ABSTRACTS)
The bibliography cites Government-sponsored research reports concerning finite element analysis as applied to structural mechanics problems. Some computer programs are mentioned, but for a more complete listing of software developed for structural problems, see the Published Searches titled "Structural Mechanics Software." (This updated bibliography contains 154 abstracts, 77 of which are new entries to the previous edition.)

Carrigan, B
National Technical Information Service July 1979, 163 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

MTIS/PS-79/0706/6ST

09 198839
WOOD PRESERVATION (CITATIONS FROM FROM THE NTIS DATA BASE)
The bibliography is a compilation of general research on wood preservation. Wood preservatives for use against attack by marine borers, fungus, and moisture decay are described. Wood treatment methods are also cited with some studies comparing their effectiveness. (This updated bibliography contains 117 abstracts, 6 of which are new entries to the previous edition.)

Brown, RJ
National Technical Information Service July 1979, 125 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0745/4ST

09 198840
WOOD PRESERVATION (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)
These abstracts of worldwide research contain information on wood preservation. Studies describing the different types of wood preservatives used, treatment methods, and durability of the preservatives are cited. (The bibliography contains 181 abstracts, 13 of which are entries to the previous edition.)

Brown, RJ
National Technical Information Service July 1979, 188 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0746/2ST

09 300416
ACCEPTANCE SAMPLING OF STRUCTURAL PAINTS
An investigation of acceptance sampling procedures for structural paints is described. The general paint manufacturing process was briefly reviewed, and historical data on frequency of rejections under specifications formerly in use in New York State were analyzed, resulting in some changes in those for viscosity. New York State Materials Method 6 and Federal Test Method Standard 141a (Method 1021), which cover paint acceptance testing, are compared. Current sampling plans are discussed and analyzed, and a suggested revision to the container sampling scheme is presented. /Authors/

This paper appeared in TRB Research Record No. 692, Adhesive Materials, Paints, and Corrosion.

Law, DA Anania, GL (New York State Department of Transportation) *Transportation Research Record* No. 692, 1978, pp 7-14, 4 Fig., 4 Tab., 5 Ref.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298865/7ST

09 300417
ACCELERATED PERFORMANCE TESTING OF BRIDGE PAINTS FOR SEACOAST ENVIRONMENTS
The design and operation are described of an accelerated-corrosion-environment chamber for evaluation of metal protective paints. The findings are discussed of experiments designed to test the reproducibility of the results obtained in the chamber and are correlated with the limited available data from an exterior weathering test fence at a tidal estuary in Brunswick, Georgia. The fundamental premise underlying the design of the chamber is that the primary stresses that account for paint-system failures on structural steel in seacoast environments are caused by continuing cycles of wetting and drying and heating and cooling in the presence of the corrosion-stimulating chloride ion. The major conclusions are that the chamber exhibits high precision of test results within runs and an exceptionally close similarity in a greatly accelerated test to the modes of panel failure observed in the field. The prospects for close laboratory-field correlation appear very good but, for general use, this correlation will require control system techniques that have been proposed but not yet validated by comprehensive experimental studies. /Author/

This paper appeared in TRB Research Record No. 692, Adhesive Materials, Paints, and Corrosion.

Tooke, WR, Jr (Tooke Engineering Associates) *Transportation Research Record* No. 692, 1978, pp 14-23, 13 Fig., 2 Tab., 18 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

09 300738
SPRING FRACTURE
The author describes how to apply the theory of fracture mechanics to the failure behaviour of springs and spring materials.

Timmins, P *Engineering* Vol. 219 No. 4, Apr. 1979, pp 468-473

ACKNOWLEDGMENT: British Railways
ORDER FROM: Design Council, 28 Haymarket, London SW1Y 4SU, England

DOTL JC

09 301138
FLAW GROWTH AND FRACTURE
The 30 papers in this publication represent the 1976 state of the art in analytical and experimental research in the field of fracture mechanics. The contents show that research is continuing in the areas of elastic-plastic behavior; toughness characterization of low-strength, high-toughness materials; environmental and residual-stress effects on crack initiation and propagation; and crack propagation under variable-amplitude loading. Fracture and fatigue behavior for cracks in regions of strain concentration and correlation between fracture-mechanics data and data obtained from rapid tests are areas of research receiving increased emphasis.

Proceedings of the Tenth National Symposium on Fracture Mechanics, sponsored by ASTM Committee E-24 on Fracture Testing of Metals, American Society for Testing and Materials, Philadelphia, Pa, August 23-25, 1976.

American Society for Testing and Materials ASTM STP 631, 1977, 519 p., Figs., Tabs., Refs.

ORDER FROM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103

DOTL TA401.A615 N631

09 301190
A FRACTURE MECHANICS APPROACH TO ROLLING CONTACT FATIGUE
Linear elastic fracture mechanics were used in the study of development of subsurface cracks in rolling contact fatigue.

Hills, DA Ashelby, DW *Tribology International* Vol. 12 No. 3, June 1979, pp 115-119, 8 Fig.

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

09 301208
VACUUM IMPREGNATION TECHNIQUES FOR GRP ON BRITISH RAIL
This article describes two closed-mould processes developed by British Rail to meet their specific qualitative and quantitative requirements. It describes a modified vacuum bag process and a vacuum impregnation process, and discusses the advantages and limitations together with process assessment factors. The technology involved is available to other moulders and will be of particular interest to those companies with similar output and quality problems to those of British Rail.

Gotch, TM *Reinforced Plastics* Vol. 23 No. 4, Apr. 1979, pp 117-121

ACKNOWLEDGMENT: British Railways
ORDER FROM: McDonald Publications of London Limited, 268 High Street, Uxbridge, Middlesex UB8 1UA, England

09 301210
FINITE ELEMENT DEVELOPMENT IN THE BRITISH RAILWAYS TECHNICAL CENTRE
An article tracing the development of the NEWPAC finite element computer program and its application to the type of structural designs encountered in the railway field.

Dodd, R *FEN-Finite Element News* Mar. 1979, pp 14-18

ACKNOWLEDGMENT: British Railways
ORDER FROM: Robinson and Associates, Wimbourne, Dorset, England

09 301445
STRESS CORROSION CRACKING OF HIGH TENSION OVERHEAD INSULATED WIRES AND ITS IMPROVEMENT
Abnormal deterioration of high-voltage polyethylene-insulated cable used for overhead distribution occurred over a two-year period. Investigation showed that stress corrosion cracking had taken place. A method of prevention was developed and structural improvements in the cables have been achieved.

Maeda, M *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 77-82, 16 Fig., 2 Tab., 8 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

09 301449
PERFORMANCE OF JOURNAL ROLLER BEARING GREASE
A test of lithium greases in roller bearings of a fleet of electric cars determined mechanical stability, wear prevention and oxidation stability. Methods of making the test and results obtained are given.

Sugiyama, S *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, p 94, 3 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

09 301724
USE OF MULTIPLE COATS OF PAINT IN THE TRANSPORT CONTEXT [Einsatz dickschichtiger Anstrichsysteme in Verkehrswesen]
Due to the increasing aggressiveness of the environment, the thickness of coats of paint applied hitherto is proving inadequate. The application of 4 to 6 coats on a single vehicle would pose problems, and appropriate methods are suggested for protecting railway vehicles and steel equipment against corrosion. [German]

Baumann, M *DET Eisenbahntechnik* Vol. 27 No. 6, 1979, pp 239-242, 4 Tab., 17 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

09 301826
PRESS-LAM TIMBERS FOR EXPOSED STRUCTURES
Parallel Laminated Veneer (PLV) products are manufactured by adhesive bonding of rotary-peeled veneer. It has been estimated that a production line

PLV process could convert green logs into a finished structural laminate in less than an hour. Press-Lam, a PLV product under investigation at the U. S. Forest Products Laboratory, has exhibited decreases in variability of mechanical properties and increases in chemical preservative penetration and retention when compared to solid-sawn lumber. A prototype highway bridge entirely of Press-Lam has been erected by the Virginia Department of Highways and Transportation. This bridge was field-tested to its AASHTO HS-20 design load. Preliminary allowable stresses were determined by data obtained from destructive laboratory tests on 18 full-scale stringers and 10 sections of decking made from Douglas-fir Press-Lam. In the face of dwindling supplies of large structural timbers, PLV products are attractive alternatives for exposed structural applications.

Youngquist, JA (Forest Products Laboratory); Gromala, DS Jokerst, RW *ASCE Journal of the Structural Division* Vol. 105 No. 7, July 1979, p 1405, 15 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

09 302017
PERFORMANCE OF ALTERNATE COATINGS IN THE ENVIRONMENT (PACE)
Anti-corrosion coatings and methods developed to meet environmental needs were selected by a consensus committee and evaluated in five environments in comparison with a range of standard materials whose long-term performance had been established. Periodic evaluations to date show that none of the alternative pigmentations were superior to the red lead or chromate controls in conventional oil or alkyd vehicles, although several were promising. In various vinyl vehicles, however these alternative pigments, including some inerts, are at least equal to red lead, probably due to an encapsulating effect. Performance of certain water-base formulations now approach the control solvent-thinned coatings to date in short term outdoor and accelerated tests. Proprietary aspects of the most promising materials will become available when approved by their suppliers. Several non-metallic abrasives were essentially equivalent to dry sand blasting. To date, centrifugally-delivered metallic shot and grit are also essentially equivalent to dry sand blasting for most products. Moisture during sand blasting has not adversely affected surface preparation, and new water/-sand/air methods are now under evaluation. 3-d stereo views illustrates these surface preparations on back cover of report. Continued work is indicated to verify early outdoor exposures and accelerated tests, as well as to evaluate new pigmentations, new water-base coatings, and further high-solids coatings, leading toward field demonstration of the most promising new technologies. /FHWA/

Bruno, JA Keane, JD Weaver, REF
Steel Structures Painting Council, Pennsylvania Department of Transportation, Federal Highway Administration, (SSPC) Final Rpt. FHWA-PA-79-05, May 1979, n.p.
SPONSORING AGENCY:

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PB300868/7ST

09 302322
TITANIUM COULD HELP MAKE THE WHEELS GO ROUND
The authors from the Technical College of Aachen, write on the wear of titanium alloys under conditions of rolling stress in railway operations.

Krause, H Scholten, J *Industrial Lubrication and Tribology* Vol. 31 No. 4, July 1979, pp 132-142, 11 Phot., 49 Ref.

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

09 303168
STUDY OF FRACTURE TOUGHNESS CHARACTERISTICS OF CAST STEELS USED IN THE RAILROAD INDUSTRY. STUDY OF AAR GRADE B, C (N&T), C (Q&T) AND E STEELS
This investigation investigated the influence of chemical composition and heat treatments on the toughness of AAR Grade B, C(N&T), C(Q&T) and E cast steels. Drop weight, Dynamic Tear and Charpy "V" notch tests were conducted on specimens provided by seven foundries. Results are presented along with analysis of the effect of structure composition and processing on toughness.

An RPI-AAR Cooperative Program, RPI-AAR Coupler Safety Project.

Morella, NA Wallace, J Canete Sigla, P
Association of American Railroads Technical Center, Case Western Reserve University Res Rpt. AAR Rpt. R357, Sept. 1979, 129 p., Figs., Tabs., 18 Ref., 1 App.

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

DOTL RP

09 303595
WASTE PRODUCTS FROM MINING AND STEEL INDUSTRIES AND THEIR UTILIZATION [Restprodukter inom gruv och staalindustrin och deras utnyttjande]
This appendix discusses the occurrence of different types of waste products from the mineral industries and the steel and metal works. In the process of refining metals to concentrate as well as in the production of iron and steel, the quantity of the raw materials is considerably greater than that of the finished production. Different types of residues, such as enriched sand, gases, slag, etc, constitute the difference. Principally, gaseous residues occur only within the iron and the steel industry and, generally, do not create any great problems since the accompanying stuff is removed. In some cases, e.g. with pig-iron, the gaseous residues can be used as fuel. The solid residues within the mining and steel industries have been considered as waste, i.e. a product of no value and without possibilities of economic exploitation. The main part of the report is devoted to slag from the steel industry and residual products from mines. Also, it discusses a realized and possible utilization of these different residues. The appendix is supplemented with (1) table of stored residues and their yearly additions, (2) detailed list of references, (3) a report on earth, earth blends and waste products. [Swedish]

Forssberg, E
Jordbruksdepartementet, (0375-250X) SOU 1979:15, 1979, pp 121-165, 7 Tab., 25 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242525), National Swedish Road & Traffic Research Institute
ORDER FROM: Jordbruksdepartementet, Fack, Stockholm, Sweden
P0197: 79-15

09 303620
RAIL QUALITY [O jakosci szyn]
Detailed description of rail quality improvement programmes including quality of Polish S60 rails made of St 90 P steel, quality of and defects in imported rails, and rail quality improvement scheme in the Soviet Union. [Polish]

Turyn, M *Drogi Kolejowe* Vol. 2-26 No. 3, May 1979, pp 129-133, 3 Ref.

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

09 303621
POSSIBILITIES OF USING ALUMINIUM ALLOYS AND PLASTICS IN CAR WHEELSETS [Mozliwosci zastosowania stopow aluminium i tworzyw sztucznych w wagonowych zestawach kolowych]
No Abstract. [Polish]

Zmuda-Sroka, MM *Trakcja i Wagony* Vol. 2-26 No. 6, June 1979, pp 188-191, 1 Tab., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

09 303630
NEW METHODS OF IMPREGNATING TIES [Novoe v propitke spal]
The article gives some examples of methods to combat rotting in cross ties such as use of oily antiseptics and deep impregnation. [Russian]

Bassarskij, MP Popov, VV *Put'i Putevoye Khozyaistvo* No. 6, 1979, pp 16-17

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

09 303657
BONDED JOINTS AND PREPARATION FOR BONDING
This lecture series contains 8 papers, all of which are indexed separately. The papers cover the following topics: operational experience with adhesive

bonded structures; interfacial fracture-mechanical aspects of adhesive joints; adhesive joint design; behavior of adhesive joints under cyclic loading; failures of adhesive joints; the nature of adhesion mechanisms and the effect of surface treatment on the behavior of adhesive joints; surface preparation for more durable joints; and nondestructive testing of adhesive joints.

AGARD Lecture Series No. 102, presented at Oslo, Norway, April 2-3, 1979; The Hague, Netherlands, April 5-6, 1979.

AGARD Lecture Series No. 102, 1979, v.p.

ACKNOWLEDGMENT: EI
ORDER FROM: NTIS

09 303661
TRACK RECORD OF POLYURETHANE COATINGS

Formulation, application, and service performance information is given on a number of urethane coatings, including some loaded with Zn. Case histories are given on applications to floors, railroad equipment, trucks, in marine environments, and in chemical plants, as well as use in low temperature climatic environments. Data are given also on surface preparation prerequisites and accelerated laboratory test methods.

Pregmon, W *Materials Performance* Vol. 18 No. 6, June 1979, pp 31-33

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

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09 303684
DEVELOPMENT OF WEAR RESISTANT AND ANTI-SHELLING HIGH STRENGTH RAILS

Recently Japanese rail manufacturers have been expected to develop two kinds of new rails: Wear resistant rails for foreign heavy load railways and anti-shelling rails for high speed railways, Shinkansen in Japan. As to the former ones, laboratory works and field tests have proved that high tensile rails with fine pearlitic structure are exceedingly wear resistant. Alloy or slack quenched rails meet this demand and are being manufactured in quantities. Concerning the latter, the first field test is being carried out on four new types of rails, manufactured and laid in Shinkansen for trial. On the other hand, rolling contact fatigue test has shown that steels with higher carbon content and fine pearlitic structure are also excellent in anti-shelling property. A newly developed head-hardened rail possessing fine pearlitic structure is expected to meet these demands. We are now making efforts to improve the weldability of this rail by small addition of alloying elements.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Masumoto, H Sugino, K Hayashida, H (Nippon Steel Corporation, Japan)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 212 Pap H.1, 1978, pp 1-8, 15 Fig., 2 Tab., 3 Ref., 1 App.

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

DOTL RP

09 303685
DEVELOPMENT OF HIGH-STRENGTH CHROMIUM-MOLYBDENUM RAIL STEEL WITH IMPROVED WELDABILITY

Chromium-molybdenum (Cr-Mo) steel rails have been in trial service since 1975, and favorable reports have been received from all test locations. These Cr-Mo rails, containing nominally 0.75% C, 0.85% Mn, 0.75% Cr, and 0.18% Mo, exhibit life expectancy equal to that of head-hardened and fully heat-treated rails. Rails of this composition require a special flash-butt welding cycle to delay the cooling rate of the weld to provide a uniform heat-affected zone microstructure. In this study, the Cr-Mo rail steel composition was modified by reducing the manganese and chromium contents while maintaining the same as-rolled hardness. The heating and cooling cycles used for making conventional flash-butt welds in carbon-steel rails were applied to the modified Cr-Mo steels. It was found that a 0.75% C, 0.60% Mn, 0.60% Cr, and 0.21% Mo steel has heat-affected zones which are virtually martensite-free under the conventional flash-butt welding conditions. This lean Cr-Mo rail steel composition appears to be well-suited for heavy duty rail production.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Fletcher, FB Smith, YE (Climax Molybdenum Company of Michigan)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 213 Pap H.2, 1978, pp 1-6, 7 Fig., 4 Tab., 6 Ref.

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

DOTL RP

09 303687
NATURALLY HARD SPECIAL-GRADE RAILS FOR HEAVY-DUTY TRANSPORTATION

The special rail grade with 1100 N/mm2 minimum tensile strength is a fine lamellar pearlitic steel with good toughness and weldability. The low hydrogen content allows normal cooling practice, controlled by ultrasonic testing of each rail. Special grade rails are produced and over 13 years have shown good performance in lines with high axle loads and severe curvature.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Heller, W Koerfer, E Schmedders, H
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 216 Pap H.3, 1978, pp 1-7, 13 Fig., 13 Ref.

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

DOTL RP

09 303688
THE DEVELOPMENT AND MANUFACTURE OF HIGH TENSILE WEAR RESISTANT 1% CHROMIUM RAILS FOR HEAVY DUTY APPLICATIONS

High strength 1% chromium rails were developed about 15 years ago after metallurgical investigation into unsatisfactory rail performance in heavy duty steelworks track. The success of this new rail steel in solving the premature failure and short rail life problems is evidenced by extensive laboratory and service test results. Improved manufacturing techniques for the necessary high quality standards include electric steel ingot production; basic oxygen steelmaking and continuous casting; and retarded cooling of continuously cast blooms. 1% Cr rail welding techniques have been developed and proved in service. Increased 1% Cr rail manufacturing capacity is now available within the British Steel Corporation to meet the increasing demand for high strength, wear resistant rails for use in the arduous service conditions of heavy duty railways.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Young, JD Hodgson, WH (British Steel Corporation)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 217 Pap H.4, 1978, pp 1-8, 13 Fig., 2 Tab., 6 Ref.

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

DOTL RP

09 303691
LABORATORY INVESTIGATION OF TRANSVERSE DEFECTS IN RAILS

A metallographic examination of transverse defects in rails has shown that their nucleation occurs at large, exogenous silicate inclusions. Fracture mechanics formulae have been applied to calculate the threshold crack size in rails subjected to heavy duty applications. Methods of reducing the occurrence of transverse defects are discussed. An apparatus used to study in the laboratory the growth of transverse defects under varying stress conditions is described.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Marich, S Cottam, JW Curcio, P (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 303 Pap I.1, 1978, pp 1-13, 25 Fig., 18 Ref.

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

DOTL RP

09 303692
FATIGUE ANALYSIS OF RAIL SUBJECT TO TRAFFIC AND TEMPERATURE LOADING

This paper utilizes a fatigue analysis methodology in the prediction of rail service life. This methodology uses a three dimensional characterization of the load environment in conjunction with material properties presented in the form of Modified Goodman Diagrams. The traffic load environment was obtained from monitoring of U.S. track in mainline service and the material properties were obtained from published laboratory test data. The fatigue analysis, based on linear cumulative damage theory, utilizes the three dimensional stress spectra obtained by combining contact, bending and temperature stresses, to predict the occurrence of transverse defects in the rail head. The predicted fatigue life for two different rail sections of similar metallurgy, is then compared to defect occurrence data obtained from U.S. mainline service. The analyses indicate fatigue failure under heavy wheel loads will occur well before the point where head wear would normally dictate rail replacement. This indicates a need for a rail replacement criterion based on either accumulated tonnage or on number of defects per unit length of track. Additionally, it is seen that heavier rail sections have a greater cumulative tonnage capacity than lighter sections subject to similar loads. Thus use of heavier rail sections will result in an increased service life for rail in mainline service.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Zarembski, AM Abbott, RA (Association of American Railroads)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 304 Pap I.2, 1978, pp 1-14, 11 Fig., 2 Tab., 28 Ref.

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

DOTL RP

09 303694
AN INVESTIGATION ON CONTACT FATIGUE AND WEAR RESISTANCE BEHAVIOUR IN RAIL STEELS

A rolling contact fatigue test was conducted to investigate the influence of load and slip on contact fatigue behavior. As load or slip increase, the onset of linear cracking and spalling (analagous to rail shelling) occurs more rapidly, while crack angle decreases and depth of spalling increases. The depth at which crack propagates corresponds to the hardness distribution under the contact surface. Wear resistance of rail steels is shown to depend mainly on distribution, shape and size of carbide in microstructure.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Ichinose, H Takehara, J Iwasaki, N Ueda, M (Nippon Kokan Kabushiki Kaisha)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 307 Pap I.3, 1978, pp 1-10, 12 Fig., 6 Tab., 6 Phot., 8 Ref.

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

DOTL RP

09 303711
MANUFACTURING EXPERIENCE WITH A WIDE RANGE OF HIGH STRENGTH RAIL STEELS

At the Port Kembla works of Australian Iron & Steel Pty Ltd a number of steels utilising chromium, niobium, vanadium and molybdenum alloying additions have been used to develop high strength rails for service in heavily loaded tracks in steelplants and in the mining industry. The alloy compositions provided significantly higher yield and tensile strengths and at least equivalent ductility to the conventional carbon steels. For the alloyed rails special procedures were necessary in steelmaking, ingot soaking and rolling. It was found that for testing purposes careful attention to cooling rate and condition of samples was necessary in order to obtain data which would be representative of the finished rails. Adjustments to finishing operations were also required because of the high strengths of the alloyed steels.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Barnsley, BP MacDonald, JK Croll, JE (Australian Iron & Steel Proprietary Limited)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 410 Pap H.5, 1978, pp 1-6, 2 Fig., 4 Tab., 8 Ref.

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

DOTL RP

09 303712
THE FLASH BUTT WELDING OF HIGH STRENGTH RAIL

This paper outlines problems associated with the flash butt welding of high strength materials and describes the modified procedures which are required for the various types of alloy and heat-treated rail. In high hardenability alloys fully pearlitic, weld microstructures are achieved through an accurately controlled post-heating cycle while for medium hardenability materials a relatively strong preheat may be sufficient. For heat-treated rail some increase in weld zone hardness and reduction in weld zone width are necessary and a number of experimental techniques to achieve this are described. Emphasis is placed on the need for strict machine control and cycle consistency in all high strength rail welding.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Vines, MJ (BHP Melbourne Research Laboratories, Australia); Townend, PH (Mt. Newman Mining Company Pty Ltd, Australia); Lancaster, G (Hamersley Iron Pty Limited, Australia); Marich, S (BHP Melbourne Research Laboratories, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 411 Pap H.6, 1978, pp 1-5, 7 Fig., 1 Tab., 3 Ref.

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

DOTL RP

09 303713
SPECIAL RAILS ON HEAVY HAUL RAILWAYS

This paper describes work on the track structures of two of Brazil's heavy-haul railways aimed at enabling them to handle large volumes of iron ore. It concentrates on performance of the special rails in use and those being tested. A method for testing rail is presented.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Oliveira, JHS
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 412 Pap I.5, 1978, pp 1-10, 2 Tab., 2 Ref.

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

DOTL RP

09 303849
CARBON-FIBER COMPOSITES

Carbon-fiber reinforcement in plastics makes possible lightweight parts with outstanding strength and rigidity. but until recently, the cost of the fibers and of processing the reinforced parts has limited uses to aerospace components and high-priced sports equipment. These costs are being

trimmed, however; some moulding compounds, at the lower end of the performance range, are already selling for well under $10/lb. Here's a look at the various types and forms of fiber available, and how they are combined in plastic matrices.

Shepler, RE Towne, MK Saylor, DK *Machine Design* Vol. 51 No. 12, May 1979, pp 88-95

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

09 304113
MATHEMATICAL ANALYSIS OF STRESS CRACKS. VOLUME 3. 1977-JULY, 1979 (A BIBLIOGRAPHY WITH ABSTRACTS)
Stress cracks are analyzed by mathematical methods, including extensive use of finite element analysis. Various materials, including metals, wood, composites, and rock are investigated.

Habercom, GE, Jr
National Technical Information Service Aug. 1979, 127 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0804/9ST

09 304329
MICROPROCESSOR UTILIZATION IN ULTRASONIC NONDESTRUCTIVE INSPECTION SYSTEMS
The purpose of this work is to demonstrate the feasibility of using microprocessors in ultrasonic inspection. Benefits of employing a microprocessor are two-fold, the first with respect to the development of a small, compact and portable inspection device, and the second with respect to obtaining flaw data in digital format for use in structural mechanics computer programs for stress analysis.

Presented at the Fall ASNT Conference, Denver, CO., 1978.

Rose, JL Thomas, GH
Drexel University Tech Rpt. June 1979, 38 p.

Contract N00014-77-C-0607

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A071203/4ST

09 304334
CONSIDERATIONS OF CRACK GROWTH AND PLASTICITY IN FINITE ELEMENT ANALYSIS
A finite element analysis was made of crack growth in a center-cracked specimen subjected to monotonically increasing load until the point of fast fracture. Since part of the specimen experienced unloading, the boundary value problem which was formulated was based upon incremental theory of plasticity. Experimental load and crack-size records were utilized. Linear relations between plastic energy and crack growth were observed. Fracture toughness parameters which were evaluated at the onset of unstable crack propagation, obtained from finite element analysis were in good agreement with those determined experimentally. (Author)

Lee, JD Liebowitz, H
George Washington University July 1978, 41 p.

Contract N00014-75-C-0946

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A071324/8ST

09 307651
WEAR OF RAILROAD FREIGHT CAR WHEELS AND RAILS
An experimental program has been conducted to study the mechanical wear of railroad wheel and rail materials under conditions simulating curve negotiation with contact between the wheel flange and rail gauge face. It was found that wear proceeds by one of two mechanisms; smearing wear or flow-fatigue wear, which differ in metal loss rates by factors of ten to one hundred. The low-rate flow-fatigue type of wear occurs when the normal forces between the wheel and rail produce subsurface shear stresses which exceed 2.32 times the yield stress of the material. Smearing wear occurs when a tractive force is superimposed on the normal force in such a way that the subsurface plastic flow boundary is brought to the surface. It was found in laboratory wear tests that rail wear was not significantly reduced by using through-hardened rail over standard rail, but that wheel wear against standard rail by factors ranging from two and one-half for high humidity to as much as sixteen for low humidity.

Presented at the ASLE Annual Meeting, 34th, St. Louis, Missouri, April 30-May 3, 1979.

Jamison, WE (Colorado School of Mines) *American Society of Lubricating Eng-Preprints* ASLE 79-AM-5E-3, 1979, 8 p., 21 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: American Society of Lubricating Engineers, 838 Busse Highway, Park Ridge, Illinois, 60068

09 307682
ARE VIGNOLE RAILS ALSO THE OPTIMUM SOLUTION FOR THE RAILWAY OF TOMORROW? [Sind Breitfussschienen auch fuer die Eisenbahn der Zukunft optimal?]
A detailed study is made as to whether Vignole rails are the optimum solution for the railway of the future. The rail is successively examined as a running surface, a guideway and a support, taking into account the natural stresses in rails, manufacturing tolerances, propagation of noise and rail welding. [German]

Herbst, W *Eisenbahningenieur* Vol. 30 No. 9, Sept. 1979, pp 383-394, 11 Phot., 3 Ref.

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

10 053338
RAILWAY NOISE. NOISE ABATEMENT MEASURES ON OLDER RAILWAY STOCK (PART 1: REFERENCE MEASUREMENTS)
This report contains the results of noise measurements taken on older railway stock (electric and diesel locomotives and passenger coaches) with a view to converting them to achieve acoustic improvement. The report describes the vehicles, their main units and the noise abatement measures adopted, and indicates the noise transmission paths, the measuring conditions and analysis methods, as well as giving the results and outlining what further work is planned.

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

International Union of Railways C 137/RP 8, Apr. 1979, 32 p., 27 Fig.

ORDER FROM: UIC

DOTL RP

10 053339
RAILWAY NOISE. NOISE ABATEMENT MEASURES ON OLDER RAILWAY STOCK (PART 2: CONVERSION MEASURES AND RESULTS)
Part 2 of the report describes the conversion of selected older-type stock (electric and diesel locomotives and passenger coaches) with a view to acoustic improvement, and gives the results achieved as indicated by the measurements. The generally conventional materials and those applied are indicated. Similar results obtained by various railway Administrations are described. The extent of conversion measures is outlined. Deductions are made concerning practical measures, materials available and principles for the various vehicles. The basic findings are summarised in a general assessment.

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

International Union of Railways C 137/RP 9, Apr. 1979, 40 p., 15 Fig., 11 Tab.

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DOTL RP

10 053345
RAILWAY NOISE. THE EFFECTIVENESS OF SOUND BARRIERS SUITABLE FOR APPLICATION TO FIXED INSTALLATIONS
This report summarises the results regarding the effectiveness of fixed protective screening devices both alongside the tracks and in the track during the passage of trains. The report also contains indications of various technical solutions, recommendations concerning the conditions of application and documents enabling the effectiveness of protective screening devices to be predetermined.

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

International Union of Railways C 137/RP 10, Apr. 1979, 40 p., 26 Fig., 8 Tab.

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DOTL RP

10 197578
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL, TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISSIONS
This report constitutes an initial assessment of the literature in critical areas relating to the measurement, control, atmospheric processes, and possible health effects of unregulated diesel emissions. The four major topics treated are: (1) Measurement and characterization of emissions; (2) Control technology; (3) Atmospheric transport, transformation, and microbiological assay; (4) Carcinogenic health aspects.

Andon, J Siegel, HM Johnson, JH Leddy, DG Smaby, S
South Coast Technology, Incorporated, National Highway Traffic Safety Administration Final Rpt. DOT-HS-804-010, Jan. 1979, 516 p.

Contract DOT-HS-7-01790

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-296075/5ST

10 197861
ENVIRONMENTAL ANALYSES IN TWO DOE ENERGY MATERIALS TRANSPORT STUDIES
This presentation reports on the in-progress and planned environmental analyses of two DOE energy materials transport studies. The first project surveyed here is the joint Department of Energy/Department of Transportation study. This effort constitutes a follow through by these agencies on a request made by President Carter in his National Energy Plan, which predicted that the United States would have to greatly increase its use of coal and other sources of energy to offset expected oil shortages. The goal of this joint project is to look into potential capacity bottlenecks and other problems that may be encountered in transporting these fuels. The second study by Argonne National Laboratory has as its goals the development and implementation of strategies to conserve energy in the shipment of energy materials. (ERA citation 04:023439)

Environmental Control Symposium, Washington, DC, 28 November 1978.

Bertram, KM
Argonne National Laboratories, Department of Energy 1978, 11 p.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

CONF-781109-11

10 198022
SURVEY OF GASOLINE TANK TRUCKS AND RAIL CARS
This informational document provides the basic and current use of tank trucks and rail cars in the gasoline marketing industry. Information contained in this document includes population, type and age of equipment, industry trends and costs for retrofitting existing vehicles to bottom loading and/or vapor recovery.

Hang, JC Sakaida, RR
Pacific Environmental Services, Incorporated, Environmental Protection Agency EPA/450/3-79/004, Mar. 1979, 48 p.

Contract EPA-68-02-2606

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293536/9ST

10 198132
ENVIRONMENTAL EFFECTS OF TRANSPORTING RADIOACTIVE MATERIALS IN NUCLEAR WASTE MANAGEMENT SYSTEMS
This paper discusses the environmental effects of radioactive materials transportation. The systems used or being designed for use in spent fuel and waste transportation are described. Accident rate and severity data are used to quantify risk. A test program in which subscale and full scale transportation systems were exposed to accident environments far in excess of those used in package design is used to relate package damage to accident severity levels. Analytical results and subscale and full scale test results are correlated to demonstrate that computational methods or scale modeling, or both, can be used to predict accident behavior of transportation systems. This work is used to show that the risks to the public from radioactive material transportation are low relative to other risks commonly accepted by the public. (ERA citation 04:021729)

71. meeting of the AICHE, Miami, FL, USA, 12 Nov 1978.

Pope, RB Yoshimura, HR McClure, JD Huerta, M
Sandia Laboratories, Department of Energy CONF-781110-11, 1978, 21 p.

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

SAND-78-1211C

10 198273
NOISE RATING CRITERIA FOR ELEVATED RAPID TRANSIT STRUCTURES
The purpose of this report is to recommend criteria for rating the noise radiated from elevated rapid transit structures during train passages, so that different types of structures can be inter-compared with respect to their noise impact on the immediate neighborhood, or alternatively, so that noise

abatement programs for elevated structures may be developed on a rational basis. In developing these criteria, the report also summarizes information that is applicable to the rating of rail transportation noise in general. The report examines the requirements for descriptors that would be suitable for rating elevated structure noise, reviews existing noise ratings, concludes that the only suitable candidates are the average sound level (Leq) and the day-night average sound level (Ldn) and examines and resolves the possible disadvantages of these choices. The report also reviews studies that have been made to determine the impact of rail transportation noise on the community, compares subjective response to rail noise with that due to road traffic and aircraft noise, and finds these responses to be nearly the same. Finally, the report delineates and illustrates application of the so-called Fractional Impact Method to assessment of the community impact of elevated structure noise, based on the results of numerous social surveys on noise, and widely used by the Environmental Protection Agency for environment impact statements.

Schultz, TJ
Bolt, Beranek and Newman, Incorporated, Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0099) Intrm Rpt. DOT-TSC-UMTA-79-25, May 1979, 146 p.

Contract DOT-TSC-1531

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-297419/4ST, DOTL NTIS

10 198279
RAILROAD RETARDER NOISE REDUCTION: STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS
Field measurements of noise were made near a railroad retarder system without barriers and with acoustical barriers of various configurations. The configurations tested included acoustically reflective and acoustically absorptive barriers with heights of 4 to 12 feet and lengths extending from 0 to 22 feet beyond retarder entrance and exit. Two of the 12 foot high barriers were also tested with a 1 foot inward projecting acoustical panel lip along the top. It was found that the absorptive barriers reduced retarder noise from a few decibels inside the barriers to as much as 25 decibels at 100 feet from the retarder on the system centerline perpendicular to the tracks. Reflective barriers increased noise inside the barriers and at points outside, but near open ends of, the barriers; and reflective barrier noise reduction at 100 feet on the perpendicular centerline was limited to about 16 decibels. Retarder noise was concentrated in a frequency range between 2 and 3 kilohertz. The analytical study presented provides details on the role of observer location as well as the various aspects of barrier configuration.
Prepared in cooperation with Industrial Acoustics Co., Inc., Bronx, NY.

Morgan, JA Ingard, U
Burlington Northern, Incorporated, Industrial Acoustics Company, Incorporated, Transportation Systems Center, National Highway Traffic Safety Administration Final Rpt. DOT-TSC-NHTSA-79-35, May 1979, 93 p.

Contract DOT-TSC-1035

ACKNOWLEDGMENT: NTIS
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PB-297502/7ST, DOTL NTIS

10 198455
FORMERLY UTILIZED MED/AEC SITES REMEDIAL ACTION PROGRAM. RADIOLOGICAL SURVEY OF THE PENNSYLVANIA RAILROAD LANDFILL SITE, BURRELL TOWNSHIP, PENNSYLVANIA. FINAL REPORT
A radiological survey was conducted at the Pennsylvania Railroad Landfill Site in Burrell Township, Pennsylvania. In 1956 and 1957, approximately 11,600 tons of radioactive material was dumped at this site and was apparently scattered over an area of less than 10 acres. The survey included measurement of the following: external gamma radiation at 1 m above the surface and at the surface throughout the site; beta--gamma dose rates at 1 cm from the surface throughout the site; concentrations of exp 226 Ra and exp 238 U in surface and subsurface soil on the site; concentrations of exp 210 Pb, exp 226 Ra, exp 230 Th, and exp 238 U in subsurface water on the site and in surface water on and near the site; and the extent of atmospheric transport of exp 222 Rn and progeny from the site. The general location of the residues transported to the site, except possibly small, scattered quantities of materials, was determined from the survey. In some areas on the site, beta--gamma dose rates of 1 cm from the surface were above pertinent guidelines.Analyses of sediment from water samples taken from drainage areas near the site indicate that some radioactive material is being carried from the site by surface run-off. Results of this survey indicate that there is no significant atmospheric transport of exp 222 Rn from the site. (ERA citation 04:029417)

Oak Ridge National Laboratory, Department of Energy Feb. 1979, 115 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DOE/EV-0005/12

10 198587
AERIAL RECONNAISSANCE OF HAZARDOUS SUBSTANCES SPILLS AND SPILL-THREAT CONDITIONS
The U.S. Environmental Protection Agency's Environmental Monitoring and Support Laboratory in Las Vegas, Nevada, conducted aerial reconnaissance over a number of industrial facilities engaged in the production, storage, and handling of hazardous substances that are located near navigable waters of the United States. The purpose of this project was to demonstrate that aerial reconnaissance procedures currently utilized in monitoring oil production, refining, and storage facilities can be applied to monitoring chemical production and storage facilities to show whether spills and spill-threat conditions exist within chemical production and storage facilities, and to provide annotated photographic examples of spills and spill-threat conditions exist within chemical production and storage facilities, and to provide annotated photographic examples of spill conditions. Typical in-plant facilities covered in this reconnaissance include: (1) product storage facilities, including storage and holding tanks, drum storage and staging areas, and dry-product stockpiles; (2) product transfer facilities, such as marine and river terminals, and tank car and truck loading racks; and (3) plant drainage and wastewater treatment facilities. The photographic examples can serve as photo interpretation keys to aid both experienced remote sensing specialists and inexperienced personnel in monitoring chemical facilities for compliance with anticipated spill prevention regulations to be issued under authority of the Federal Water Pollution Control Act (FWPCA) as amended in 1977.

Johnson, HV
Lockheed Electronics Company, Incorporated, Environmental Protection Agency Final Rpt. EPA/600/4-79/027, Apr. 1979, 73 p.

Contract EPA-68-03-2636

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-294980/8ST

10 199069
GUIDELINES FOR ASSESSING THE ENVIRONMENTAL IMPACT OF PUBLIC MASS TRANSPORTATION PROJECTS: EXECUTIVE SUMMARY
The report is a summary of a five (5) volume set of Notebooks designed to assist people responsible for the environmental assessment of public mass transportation projects. This summary introduces the reader to the purpose, organization, and content of the Notebooks, and to the relationship between the technical guidance presented in this series and the administrative guidance and requirements presented in UMTA, DOT, CEQ, and other Federal documents. The summary serves as an introduction for the potential user of the Guidelines for Assessing the Environmental Impact of Public Mass Transportation Project (Report No. DOT-P-79-00-003).
See also report dated Apr 79, PB-299 697.

Lemer, AC
Voorhees (Alan M) and Associates, Incorporated, Asst Secretary for Policy & International Affairs DOT/P-79/00/003, Apr. 1979, 23 p.

Contract DOT-PS-90484

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299696/5ST, DOTL NTIS

10 199070
GUIDELINES FOR ASSESSING THE ENVIRONMENTAL IMPACT OF PUBLIC MASS TRANSPORTATION PROJECTS. NOTEBOOKS 1-5
The report is designed to assist people responsible for the environmental assessment of public mass transportation projects with an emphasis on major fixed guideway investments. Under each of nineteen principal components of environment, the nature of impact is defined; presently available methods for impact projection are described; data needs are summarized; and measures to mitigate adverse impact are examined. General principles applicable to the environmental assessment process are discussed. An extensive bibliography is furnished.

See also report dated Apr 79, PB-299 696. Prepared in cooperation with Daniel, Mann, Johnson and Mendenhall, and Hammer, Siler, George Associates.

Lemer, AC
Voorhees (Alan M) and Associates, Incorporated, Asst Secretary for Policy & International Affairs Final Rpt. DOT/P-79/00/001, Apr. 1979, 775 p.

Contract DOT-OS-80042

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299697/3ST, DOTL NTIS

10 199098
ALLEVIATION OF PRESSURE PULSE EFFECTS FOR TRAINS ENTERING TUNNELS
This study was carried out for the Transportation Systems Center of the U.S. Department of Transportation on behalf of the Urban Mass Transportation Administration in order to determine to what degree it is possible to attenuate the effects of pressure pulses on the passengers in trains entering tunnels. The emphasis of this study is on the approach of modifying the normal, abrupt entry portal of the constant diameter single-track tunnel. In order to understand this approach, which requires the tailoring of a tunnel portal, it was first necessary to have an analytical model in which confidence exists in its capability to predict realistic pressure pulse histories of trains entering tunnels having porous and/or flared entry portals. To accomplish this, the best available theoretical information along with small-scale laboratory experiments were used to update an existing computer program. Then, this program was used to demonstrate effective portal configurations. Although reasonable modifications to the tunnel entrance portal may not decrease the magnitude of the pressure rise, they are very effective in reducing the discomfort to the human ear by decreasing the rate of pressure rise to what the normal ear can accomodate. A brief qualitative comparison was made of this portal modification approach with other approaches: decreasing the train speed during the tunnel entry and 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 the subway transit system.

Dayman, BJ Holway, HP Hammitt, AG Tucker, CE, Jr Vardy, AE
Jet Propulsion Laboratory, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT/TSC/UMTA-79/28, UMTA-MA-06-0100-7910, June 1979, 235 p.

Contract DOT-RA-N-02-612-0397

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299155/2ST

10 300585
NOISE PROBLEMS ALONG RAILWAY LINES [Laermprobleme an Eisenbahnlinien]
On the occasion of the modernisation of Kloten's city-to-airport rail link, it was decided to investigate the noise problems to be expected during the laying of new track at Bassersdorf, and these compared with the existing noise situation. The article explains the noise-model, noise-emission limit values and noise protection measures. [German]

Scherrer, HU *Schweizerische Bauzeitung* Vol. 96 No. 26, June 1978, pp 520-523, 4 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Verlag der Akademischen Technischen Vereine, Postfach 630, 8021 Zurich, Switzerland

10 300598
BACKGROUND DOCUMENT FOR PROPOSED REVISION TO RAIL CARRIER NOISE EMISSION REGULATION
No Abstract.

Environmental Protection Agency 1979, 536 p., Refs.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Environmental Protection Agency, Office of Noise Abatement and Control, 1921 Jeff Davis Hwy, Arlington, Virginia, 20460

10 300600
DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED REVISION TO RAIL CARRIER NOISE EMISSION REGULATION
No Abstract.

Environmental Protection Agency 1979, 6 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Environmental Protection Agency, Office of Noise Abatement and Control, 1921 Jeff Davis Hwy, Arlington, Virginia, 20460

10 300608
ENERGY AND ENVIRONMENTAL ANALYSIS OF A PROPOSED COAL RAIL HAUL RATE INCREASE. ENVIRONMENTAL STUDY NO. 5
An analysis has been made of the potential environmental impacts of the request by the Burlington Northern Railroad for a proposed rate increase to haul coal from a mine in Wyoming to the J.T. Dealy coal-fired power plant of the San Antonio City Public Service Board. The proposed rate increase by the railroad would raise the cost of moving the coal from the present $11.94 per ton to $18.23 per ton; the effect would be to make the coal less competitive than fuel oil and to cause increased oil burning at the V.H. Braunig and O.W. Sommers plants. This proposed action would affect the distribution of the types and amounts of fuel supplies used with resultant environmental impacts on air pollutant emissions, air quality levels and water quality parameters.

Cooper, HBH, Jr Miksad, RW Fruh, EG
Texas University, Austin UT/CES-ES-5, Aug. 1978, 61 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: NTIS

10 300731
INFLUENCE OF SURFACE CORRUGATION OF WHEEL-TREAD ON RUNNING NOISE IN SHINKANSEN
As reported previously, the special composite sliding block has been applied on the wheel-tread of the SHINKANSEN vehicle for the purpose of improving adhesion with better results. Before it was universally adopted in 1973, seven train sets, in each of which eight vehicles, half of a train, were equipped with special composite blocks and others with conventional cast iron blocks, had been under running test for a certain period to compare the occurrences of skidding. Then running noise was also measured at a point 7 m apart from the center of both up and down tracks and at rail level. As a result, it was recognized that the noise generated in passing of the trucks equipped with the special composite blocks was 5-7 dB(A) less than that with conventional cast iron blocks. Particularly the difference was remarkable over a higher frequency range of noise spectrum. Then the relationship between rolling noise and surface corrugation on a wheel-tread was investigated by using a specific train set for the purpose of examining the mechanism of noise generation as well as the measure of reducing rolling noise.

Ohyama, T *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 4, Dec. 1978, pp 187-188

ACKNOWLEDGMENT: British Railways
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

10 301141
CALCULATION OF NOISE CHARTS [Berechnung von Laermkarten]
In order to calculate the distribution of noise in built-up areas, a computer program has been developed for the Bavarian State Ministry for Land

Development and the Environment, with which noise charts can be produced. The computing process takes account of non-static sources of noise (vehicles, aeroplanes) and static sources (the noise of construction and industry, sirens, etc). In particular, various classes of vehicles are differentiated (passenger cars, heavy goods vehicles, motor cycles, railways). Equally, the limiting factors relating specifically to the roads, such as right-of-way regulations, gradient and road surface are considered. The position and ground plans of buildings and walls, as well as differences in the ground level, all of which are relevant for the pattern of sound distribution, are extracted from flood charts and computerized. The heights of the sound buffers, where they cannot be obtained from municipal data, are, like the structure of the walls of houses, found by reconnaissance. These data are used to calculate the reflection, screening and absorption by obstacles. In the same way, the spectral atmospheric absorption is taken into consideration. The program was tested for practicability and accuracy by means of control measurements. Calculations and measurements of town districts with a total area of approximately 10 sq km were made. The districts chosen were industrial areas, old quarters, areas with tall buildings, residential suburbs, main thoroughfares and health resorts. The average calculation and measurement deviation in over 200 random samples is 2.6 db(a). A proportion of the deviations can be traced back to circumstances beyond the control of the program, such as exceeding the speed limits, inaccurate measurements and statistical fluctuations. /TRRL/ [German]

Bschorr, O *Umwelt* Vol. 8 No. 2, Apr. 1978, pp 111-113, 2 Fig., 3 Tab., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307819), 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

10 301168
REPORT ON THE ACCIDENTAL LOSS OF 115,000 L OF HYDROCARBONS AT VAUMARCUS [Rapport sur l' ecoulement accidentel de 115 000 l d'hydrocarbures a Vaumarcus]
As a result of a collision on the railway at Vaumarcus on the edge of Lake Neuchatel, two tank wagons filled with heavy domestic oil and a wagon of bitumen burst open, and their contents poured out into the surrounding countryside. The author briefly describes the work of clearing up and recovery of the contents. [French]
Also published in German.

Habersaat, R *Schweizerische Feuerwehr-Zeitung* Vol. 105 No. 6, 1979, pp 274-283, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Schweizerischer Feuerwehrverband, Ensingerstrasse 37, CH-3000 Bern 16, Switzerland

10 301206
THE USE OF A HYDRAULIC ANALOGY FOR MODELLING THE UNSTEADY FLOWS IN RAILWAY TUNNELS
This paper deals with the use of a hydraulic analogy for predicting flows and pressures within railway tunnels during the passage of trains. In the analogy the prototype is simulated using an open channel model, and prototype air flows and pressures are determined from water movements in the model.
Paper presented to the 3rd International Symposium on the Aerodynamics and Ventilation of Vehicle Tunnels, Sheffield, March, 1979.

White, WR Pope, CW
British Hydromechanics Research Association Conf Paper Paper H.1, 1979, 18 p.

ACKNOWLEDGMENT: British Railways
ORDER FROM: British Hydromechanics Research Association, Cranfield MK43 0AJ, Bedfordshire, England

10 301411
DIFFERENCES BETWEEN RAIL AND ROAD NOISE [Unterschiedliche Laestigkeit von Strassenverkehrslaerm und Schienenverkehrslaerm]
Results of comparative studies into road and rail noise, followed by comments on the different types of noise and an explanation of why railway noise is less unacceptable than road noise. [German]

Hauck, G *Eisenbahntechnische Rundschau* Vol. 28 No. 5, May 1979, pp 365-374, 3 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

10 301412
NEW FACTS ON RAILWAY NOISE [Neuere Erkenntnisse zur Schallabstrahlung von Schienenfahrzeugen]
The article reports on measurements carried out and not on theoretical studies. These measurements show that railway noise depends not only on speed and distance, but also on the shape of wheelsets, the type of bogie, and the condition of the running surface. The author goes on to reaffirm the case for disc brakes, which are far less noisy than cast iron brake shoes. Lastly, he comments on the test results carried out to ascertain which, of the rail or the wheel, is the main source of noise. [German]

Willenbrink, L *Eisenbahntechnische Rundschau* Vol. 28 No. 5, May 1979, pp 355-362, 18 Phot., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

10 301414
PROTECTION FROM NOISE ON EUROPEAN RAILWAYS [Die Laermabwehr bei den europaeischen Eisenbahnen]
As part of the environmental protection process, a considerable amount of data has been compiled as regards protection from noise on European Railways. Special emphasis is laid on railway noise, which is much more acceptable environmentally than that of other modes. The article describes some of the measures introduced: antinoise walls, fairing of running gear, reduction of grinding in curves and of brake screeching. Other measures are expected in this sphere between now and 1981. [German]

Zboralski, D *Die Bundesbahn* Vol. 55 No. 6, June 1979, pp 441-449, 9 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

10 301430
EFFECTS OF CLIMATIC CONDITIONS ON METRO USERS [Les effets des conditions climatiques sur les usagers du metro]
The increase in the number of passengers and improvement of the performance of rolling stock have modified climatic conditions prevailing in the stations and coaches. Studies have been conducted to determine the relationship between climatic conditions and the passengers' sense of comfort. Ventilation is one of the most important aspects. [French]

Grivel, F Flahaut, J *Sciences et Techniques* No. 59, Apr. 1979, pp 36-43, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris 9e, France

10 301442
THEORETICAL CONSIDERATION ON TRAIN DRAUGHT IN LONG RAILWAY TUNNELS AND ITS APPLICATION TO PRACTICAL CASES
Ventilation of long double-track railway tunnels was investigated. Air flow involved with passing trains is basic to ventilation. A method for predicting exhaust gas concentrations when there are frequent diesel-powered trains was developed. A method for calculating temperature rise in tunnels traversed by frequent high-speed trains is described. The problem of temperature for the long Seikan tunnel has resulted in a recommendation for a longitudinal ventilation system.

Fukuchi, G *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 57-64, 12 Fig., 2 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

10 301714
DETERMINATION OF THE DISTURBANCE CAUSED BY TRANSPORT NOISE ACCORDING TO TYPE OF TRANSPORT AND TRAFFIC VOLUME IN A SUBURBAN AREA--ROAD AND RAIL TRAFFIC [Ermittlung der Belaestigung durch Verkehrslaerm in Abhaengigkeit von Verkehrsmittel und Verkehrsdichte in einem Ballungsgebiet--Strassen-und Eisenbahnverkehr]
It was necessary to study whether road noise caused disturbances and, if so, to what extent and how it was different from railway noise of the same level. The results of a comparison between road and railway noise are clearly in favor of the railways. [German]

Heimerl, G Holzmann, E *Kampf dem Laerm* Vol. 26 No. 3, 1979, pp 64-69, 5 Tab., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: VJF Lehmanns Verlag, Agnes-Bernauer Platz 8, 8 Munich 21, West Germany

10 301820
COMPLETING THE ENVIRONMENTAL PACKAGE
While intercity travel has been transformed with new equipment and high-speed service in Britain over the past two decades, British Railways is looking at the attractiveness of not just its trains but of its stations and wayside. Railways must be good neighbors because political support depends crucially on public perception of their very real social and environmental benefits. Station construction, reconstruction, cleaning and the maintenance of right of way are all coming in for attention.

Kaukas, B (British Railways Board) *Railway Gazette International* Vol. 135 No. 9, Sept. 1979, pp 809-812, 8 Phot.

ORDER FROM: ESL

DOTL JC

10 301827
CHARACTERIZATION OF THE SOLUBLE ORGANIC FRACTION OF DIESEL PARTICULATE MATTER
This paper is concerned with the demonstration of a methodology for chemically characterizing diesel particulate organic matter (POM) emissions. The procedure begins with a Soxhlet extraction of the POM with dechloromethane to obtain a soluble organic fraction (SOF). The acidic and basic portions of the SOF are isolated by liquid-liquid extraction techniques with aqueous base and aqueous acid, respectively. The neutral portion of the extract is separated into paraffin, aromatic, transitional, and oxygenated fractions by column chromatography on silica gel. Two additional fractions, the ether insoluble and hexane insoluble fractions, are also separated. Quantitative mass data are presented on the extraction and fractionation of twelve particulate samples from the exhaust of a medium-duty diesel engine collected in a dilution tunnel at a volume dilution ration of 8 to 1. Three fuels with a range of properties and two steady-state engine conditions from the EPA 13 Mode Cycle were used as experimental variables.

Funkenbusch, EF (Michigan Technological University); Lebby, DG Johnson, JH *Society of Automotive Engineers Preprints* SAE 790418, 1979, 21 p., 40 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 302139
MODERN HYGIENIC TOILETS FOR COACHING STOCK
In relation to the unhygienic circumstances of "open" toilets in general use for railway coaching stock hygienic toilets are proposed, which meet the demands of environment protection. Full and partial storage systems and incinerating toilets are shortly described. In relation to demands of the railways to spend little working time on service and maintenance of such equipments and in relation to demands for little investment and energy requirements, a partial storage system or incinerating toilets with partial storage of fluid feces are proposed as good solutions. [German]

Hentschel, K *DET Eisenbahntechnik* Vol. 27 No. 6, June 1979, pp 244-246

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

10 302151
CHARACTERIZATION OF HEAVY-DUTY DIESEL GASEOUS AND PARTICULATE EMISSIONS, AND EFFECTS OF FUEL COMPOSITION
Gaseous and particulate emissions from two heavy-duty diesel engines were characterized while the engines were operated on five different fuels. Characterization included mass rates of major exhaust products, plus analysis of particulate matter for sulfate, trace elements, major elements, total solubles, and other properties. Analysis of rate and composition data was conducted with regard to fuel and engine effects on particulate. Two large particulate samples were also collected for alter analysis on groups of organics present.
For Meeting held February 26-March 2, 1979.

Hare, CT (Southwest Research Institute); Bradow, RL *Society of Automotive Engineers Preprints* SAE 790490, 1979, 29 p., 16 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 302331
SOME ASPECTS OF NOISE FROM BRITISH PASSENGER TRAINS
No Abstract.

Baker, CJ *Journal of Sound and Vibration* Vol. 64 No. 4, June 1979, pp 589-596, 4 Phot.

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

DOTL JC

10 302365
SPECIAL FEATURES REPORT--OIL SPILLS
Southern Pacific has highly organized programs to prevent and counter oil spills from any source. A case study of SP's Oregon Division with a description of the road's own organization and available equipment, along with arrangements with outside organizations are described. An actual derailment with consequent diesel fuel spillage and the steps that had to be taken are described.
Proceedings of the Eighty-Third Annual Convention of the American Railway Bridge & Building Association held September 18-20, 1978, Chicago, Illinois.

Karsten, RC (Southern Pacific Company)
American Railway Bridge & Building Association Proceeding Vol. 83, 1978, pp 95-102

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

10 302374
LEGAL PROVISIONS FOR PROTECTION AGAINST NOISE IN THE FEDERAL REPUBLIC OF GERMANY [Rechtliche Regelungen zum schutz gegen laerm in der Bundesrepublick Deutschland]
This article provides a survey of the most important laws concerning noise from building operations, aircraft as well as from rail and road traffic. Noise arising from manufacturing industry is discussed in connection with noise from construction work. The contents of statutes and regulations intended as protections against excessive noise are concisely dealt with. (TRRL) [German]

Vogel, AO (Bundesministerium Des Innern, West Germany) *Kampf dem Laerm* Vol. 25 No. 1, Feb. 1978, pp 9-12, 16 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 307764), 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

10 302379
NOISE IMPLICATIONS OF THE TRANSFER OF FREIGHT FROM ROAD TO RAIL. REPORT BY A WORKING GROUP OF THE NOISE ADVISORY COUNCIL
One of the chief sources of traffic noise in its most disturbing form is the heavy lorry. The working group have considered whether the transfer of freight to some other mode would alleviate the noise nuisance. Factors affecting the present volume of freight traffic and future trends are analysed. Noise levels of road and rail traffic are compared taking into account the

proportion of the population exposed to various levels who are seriously disturbed. Little work has been done on the response to railway noise. Sample comparisons of road and rail noise are made over their operational speeds. It is shown that a major transfer of freight from road to rail could significantly improve the noise climate, particularly in urban areas where many people live close to the roadside. However the council concludes that the wholesale transfer of freight from road to rail is not practicable and suggests methods that would enable more active measures to be taken to reduce the present level of traffic noise. (TRRL)

Her Majesty's Stationery Office Monograph 1978, 16 p., 3 Fig., 2 Tab., 2 Phot., 12 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241854)
ORDER FROM: Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, England

P7903119

10 302382
PROBLEMS OF NOISE PREVENTION IN RAIL-BOUND TRANSPORT [Probleme des laermschutzes an schienenbahnen]
The federal law on prevention of pollution allows a so-called "track bonus" for rail-bound transport, being a margin by which its noise-level may exceed that due to road traffic. The article discusses the problem of noise limits in relation to rail-bound transport as well as the possibilities-taking the effects on costs in account-for reducing the noise-levels of such transport. Finally, it deals with a political question as to which limiting values and which detrimental effects ought to be deemed acceptable. [German]

Girnau, G *Internationales Verkehrswesen* Vol. 30 No. 1, Jan. 1978, pp 15-20, 7 Fig., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 307720), 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

10 302413
ENVIRONMENTAL PLANNING AND DESIGN FOR RAPID TRANSIT FACILITIES
The National Environmental Policy Act of 1969 and related environmental laws mandated certain environmental considerations for major federal actions. The principal tool for documenting these considerations was the environmental impact statement. This requirement, interpreted and implemented by each federal agency, has given environmental planning concerning federally funded public improvements, such as transit facilities, its scope. This paper discusses the environmental planning studies and methodologies involved in preparing an impact statement for rapid-transit projects under the Urban Mass Transportation Administration. Emphasis is given to major issues, including alternatives analysis, environmental-impact analysis, and analysis of parklands and historic properties. The primary considerations in each subject area and specific approaches to an analysis that would satisfy the requirements of the National Environmental Policy Act of 1969 and related environmental directives are examined. The Metropolitan Dade County Rail Rapid Transit System is used as an example. (Author)

This paper appeared in Transportation Research Record 716, Local and Regional Development and Transportation Needs.

Muse, EC (Schimpeler-Corradino, Associates); Stewart, ST (Kaiser Transit Group); Sexton, BJ Beard, SR (Schimpeler-Corradino, Associates); Marner, A (Urban Mass Transportation Administration)
Transportation Research Record No. 716, 1979, pp 1-8, 3 Fig., 1 Tab., 1 Ref.

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10 303616
CRITERIA AND ALTERNATIVES IN THE SELECTION OF NOISE ABATEMENT STRATEGIES
The impact of economic and demographic pressures on noise legislation and abatement strategies is examined with the purpose of anticipating the evolution of noise control trends. After examining various facets of the relation between socio-economic factors and various noise problems, motor vehicle noise is selected as an example for detailed analysis.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Junger, MC (Cambridge Acoustical Associates, Incorporated)
American Society of Mechanical Engineers Conf Paper 79-WA/DSC-6, July 1979, 6 p., 13 Ref.

ORDER FROM: ESL

10 304275
ENVIRONMENTAL IMPACT OF ACCIDENTS INVOLVING RADIOACTIVE MATERIAL SHIPPING SYSTEMS
Four full-scale spent fuel cask crash tests have been performed, including two head-on truck-barrier impacts (100 and 135 km/h), one railcar-barrier impact (130 km/h), and one locomotive grade crossing impact (130 km/h). Releases to the environment were limited to seepage of about 100 cc of cavity liquid from the cask head in the 135 km/h truck impact test and a slight head seal air leak in the 130 km/h locomotive grade crossing test. These releases were well within the limits specified by the NRC regulations, would have been easily cleaned up, and would have caused little effect on the environment and virtually no risk to the public. To further evaluate cask capability, the crashed spent-fuel rail cask system was fire tested. The cask withstood 90 minutes of a fully engulfing hydrocarbon pool fire while maintaining its structural integrity. At approximately 100 minutes into the fire test, the outer shell of the cask cracked resulting in the partial loss of lead radiation shielding. The failure of the shell was attributed to poor quality control during the original fabrication of the cask in the early 1960's. Present regulatory standards would prevent such occurrences in casks built and licensed today. In addition, the test was much more severe than the qualification criteria specified by present licensing requirements.

Environmental control symposium, Washington, DC, USA, 28 Nov 1978.

Yoshimura, HR Pope, RB Huerta, M Nilson, RH
Sandia Laboratories, Department of Energy CONF-781109-27, 1978, 19 p., 13 Fig., 4 Tab.

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS
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SAND-78-1584C

10 304345
HANDBOOK OF VIBRATION AND NOISE CONTROL
The static and dynamic properties of rubberlike materials are reviewed initially, followed by discussion of the simple and compound mounting systems. Reference is also made to the dynamic vibration absorber and to the measurement of mount transmissibility. Three sections then describe the natural frequencies, the mechanical impedances, and the transmissibility of structural members. Finally, four-pole parameter analyses are reviewed and the relative transmissibility of various mounting systems supported by a variety of non-rigid foundations is discussed. (Author)

Snowdon, JC
Pennsylvania State University, University Park Final Rpt. PSU/ARL/TM-79-75, Apr. 1979, 204 p.

Contract N00024-79-C-6043

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A071485/7ST

10 304419
ENVIRONMENTAL ASPECTS OF COMMERCIAL RADIOACTIVE WASTE MANAGEMENT
Volume 2 contains chapters 6 through 10: environmental effects related to radioactive waste management associated with LWR fuel reprocessing-mixed-oxide fuel fabrication plant; environmental effects related to transporting radioactive wastes associated with LWR fuel reprocessing and fabrication; environmental effects related to radioactive waste management associated with LWR fuel reprocessing- retrievable waste storage facility; environmental effects related to geologic isolation of LWR fuel reprocessing wastes; and integrated systems for commercial radioactive waste management. (ERA citation 04:042434)

Battelle Memorial Institute/Pacific Northwest Labs, Department of Energy May 1979, 492 p.

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DOE/ET-0029(V.2)

10 304458
NOISE POLLUTION ECONOMICS (A BIBLIOGRAPHY WITH ABSTRACTS)
The economic factors of noise pollution control and management are presented for industry, urban areas, Government planning, and transportation. The majority of reports cover the economic impact of controlling aircraft noise or the impact of motor vehicle noise on society.

Cavagnaro, DM
National Technical Information Service Sept. 1979, 125 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0917/9ST

10 307642
ORIGINS OF HYDROCARBON AND CARBON MONOXIDE EMISSIONS FROM DIESEL ENGINES
The combustion regimes which lead to the emission of HC and CO in the diesel engine exhaust are postulated. This provides a basis for interpreting the experimental data which are presented to show the effect of a range of fuel injection and engine variables on HC and CO emissions for both direct and indirect injection engines. The results and analysis illustrate the potential of the diesel engine to emit very low levels of both HC and CO, and the various measures which are required to achieve this ideal are outlined.

International Congress, 17th, Budapest, Hungary, June 4-10, 1978.

Greeves, G Wang, CHT *FISITA* Vol. 2 1978, pp 779-804, 13 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Omkdk Technoinform, Budapest, Hungary

10 307670
THE ENVIRONMENTAL IMPACT OF RAILWAYS
Subjectively railways are widely regarded as environmentally favorable. This paper attempts an objective and quantitative evaluation, mainly by comparison with other modes of transport.

Collins, AH *Railway Engineer International* Vol. 4 No. 5, Sept. 1979, pp 49-52, 2 Fig., 1 Tab., 12 Ref.

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

DOTL JC

10 308433
EQUIVALENT MEAN ENERGY LEVEL FROM RELATIVELY SHORT PARTS OF RAILWAY
A modified model of train noise is presented. Computer noise profiles of travelling trains are developed through a digital computer program based on this model and compared with experimental results. A method is given to predict the equivalent mean energy level from relatively short parts of railway lines.

Louden, M *Journal of Sound and Vibration* Vol. 66 No. 1, Sept. 1979, pp 69-73

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

11 197631
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. ENTRAINMENT AND PLATOONING ANALYSIS AND DESIGN. APPENDIX B. TRAINSIM SIMULATION PROGRAM USER'S GUIDE
This document, (a part of the Appendixes of Part A, Entrainment and Platooning, Volume 5 (UMTA-IT-06-0148-79-5), Vehicle Longitudinal Control and Reliability (VCLR) Program), describes TRAINSIM, a Fortran simulation program developed to support the VLCR Entrainment studies. The program is capable of simulating the operation of a single "master" vehicle, a low-speed collision of the master vehicle into a stopped "slave" vehicle to effect coupling, and the operation of a coupled two-vehicle train. Longitudinal control is provided on the master vehicle only. The vehicles may employ linear induction motor propulsion or dc motor propulsion. Section 2 herein describes the simulation model, scenario, and structure. This volume documents the study work done on Entrainment and Platooning analysis and design as related to vehicle longitudinal control. Entrainment concept analysis, entrainment control studies (including maneuvers, simulations, and control concepts), automatic coupler alignment and hardware concepts, entrainment cost analysis, and platooning studies are also included. Part A of this report addresses entrainment and Part B addresses platooning.

Lorenz, D Lindgren, C Mahaffy, J
Otis Elevator Company, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0148-79-6, Feb. 1979, 184 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
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PB-297129/9ST

11 197655
INDUCTIVE COMMUNICATION SYSTEM DESIGN SUMMARY
The report documents the experience obtained during the design and development of the Inductive Communications System used in the Morgantown People Mover. The Inductive Communications System is used to provide wayside-to-vehicle and vehicle-to-wayside communications for command and control signaling. To aid future designers, system design and supporting analyses are discussed.

Johnstone, TN
Boeing Aerospace Company, Transportation Systems Center, Urban Mass Transportation Administration Final Rpt. DOT-TSC-UMAT-78-49, Sept. 1978, 187 p.

Contract DOT-TSC-1275

ACKNOWLEDGMENT: NTIS
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PB-295413/9ST, DOTL NTIS

11 197661
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 4: DESIGN GUIDELINES
This report is the fourth volume of an eight-volume final report associated with the AGT Guideway and Station Technology Project. The objective of the project is to develop guideway, station and weather protection concepts which will reduce the cost and implementation time associated with Automated Guideway Transit (AGT) systems as well as improving performance. This report addresses only the design guidelines portion of the guideway and station work. The purpose herein is to provide design guidelines for AGT planners and designers to assist them in providing acceptable, safe and reliable guideways and stations at the lowest possible life cycle costs. Guidelines are also provided for AGT system sponsors to indicate the type of information that they should provide to the guideway and station designers prior to initiation of preliminary engineering activities; i.e., after all predesign planning activities for the AGT system have been completed. Guidelines were prepared following a review of the guideways and stations associated with 30 AGT and related systems. The review included examination of the design criteria, design codes, site integration and construction techniques employed. The guidelines, which represent the current state-of-the-art in the design of AGT guideways and stations, focus on AGT systems with bottom-supported, rubber-tired vehicles and at-grade or above-grade guideway and station placement. They cover guideway and design integration and the guideway/vehicle interface, in addition to guideway and station design.

Prepared in cooperation with ABAM Engineers, Incorporated, Tacoma, Washington. See also Volume 2, PB-281632.
Stevens, RD
De Leuw, Cather and Company, ABAM Engineers, Incorporated, Urban Mass Transportation Administration, (UMTA-IT-06-0152) Mar. 1979, 330 p.

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-295613/4ST

11 197705
INVESTIGATION OF THE DYNAMICS OF A MAGLEV VEHICLE TRAVERSING A FLEXIBLE GUIDEWAY: THEORY AND EXPERIMENT
This report presents the results of a research program conducted jointly by the United States Department of Transportation and the Federal Republic of Germany Ministry for Research and Technology. The object of this program was to study the dynamics of a maglev vehicle traversing a flexible guideway. Work in the U.S. was carried out at MITRE/Metrek in McLean, Virginia; work in the FRG was carried out at Transrapid-EMS in Munich. Two types of experiments were conducted using the full-scale KOMET test track in Manching, Germany. In the first, sinusoidal guideway deviations were deliberately introduced, and the KOMET vehicle was run over these at various speeds up to 324 KM/HR. The second type of test involved removing pier supports from the test track in order to make it more flexible. Theoretical predictions of the dynamic motions from a MITRE computer program are compared to the experimental results.

Katz, RM
Mitre Corporation, Department of Transportation Final Rpt. DOT-TSC-RSPA-19110, Apr. 1979, 136 p.

Contract DOT-TSC-1263

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-295786/8ST, DOTL NTIS

11 197898
GUIDEWAY TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)
The bibliography cites research on automated guideway transportation (AGT), in which passengers or freight can be transported along tubes or rails under automatic control. The carriers, termed personal rapid transit vehicles or people movers, can accommodate individuals or small or larger groups. The reports cover many aspects of technology, such as demand actuated service, networks, elevated structures, monorail, light rail, computer aided control, vehicle merging, headway safety, shuttle loops, guideway designs, magnetic levitation, suspended vehicles, and dual mode. Discussions are made of steering control, ride quality, airport services to move people or baggage, gravity assistance in accelerating and braking, test vehicles, and maintenance. Other topics are cost comparisons of AGT with conventional transit, fares, and equipment failure. Air cushion vehicles are excluded. (This updated bibliography contains 185 abstracts, 28 of which are new entries to the previous edition.)

Kenton, E
National Technical Information Service Bibliog. May 1979, 191 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0429/5ST

11 198070
COAL SLURRY PIPELINES: PROGRESS AND PROBLEMS FOR NEW ONES
This report summarizes information on some of the key issues concerning coal slurry pipelines--pipelines that carry a mixture of coal and water--and whether pipeline companies need Federal eminent domain legislation to help acquire rights-of-way along proposed routes. It discusses the current status of seven proposed pipelines and points out that at least four may be built by the mid-1980's even without Federal eminent domain legislation. The report highlights some recent changes that have occurred since the Coal Pipeline Act of 1978, proposed in the 95th Congress, was defeated in July 1978.

General Accounting Office CED-79-49, Apr. 1979, 34 p.

ACKNOWLEDGMENT: NTIS
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PB-294072/4ST

11 198301
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACKED RAM AIR CUSHION VEHICLE (TRACV) SUSPENSION ALTERNATIVES

A linearized model of the pitch-heave dynamics of a Tracked Ram Air Cushion Vehicle is presented. This model is based on aerodynamic theory which has been verified by wind tunnel and towed model experiments. The vehicle is assumed to be equipped with two controls which can be configured to provide various suspension system characteristics. The ride qualities and dynamic motions of the rigid vehicle moving over a guideway described by roughness characteristics typical of highways is examined in terms of the rms values of the vertical acceleration in the foremost and rearmost seats in the passenger cabin and the gap variations at the leading and trailing edges of the vehicle. The improvement in ride qualities and dynamic behavior which can be obtained by passive and active suspension systems is examined and discussed. Optimal regulator theory is employed to design the active suspension system. The predicted rms values of the vertical acceleration in the one-third octave frequency bands are compared with the vertical ISO Specification. It is shown that marked improvements in the ride qualities can be obtained with either the passive or active suspension systems.

See also report dated September 77, AD-A046565.

Luhrs, RA Sweet, LM Curtiss, HC, Jr
Princeton University, Transportation Systems Center Intrm Rpt. DOT-TSC-RSPA-78-23, June 1979, 132 p.

Contract DOT-TSC-682

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-297840/1ST

11 198428
HIGH-PERFORMANCE BATTERIES FOR ELECTRIC-VEHICLE PROPULSION AND STATIONARY ENERGY STORAGE. PROGRESS REPORT, OCTOBER 1977--SEPTEMBER 1978

The research, development, and management activities of the programs at Argonne National Laboratory (ANL) and at industrial subcontractors' laboratories on high-temperature batteries during the period October 1977--September 1978 are reported. These batteries are being developed for electric-vehicle propulsion and for stationary-energy-storage applications. The present cells, which operate at 400 to 500 deg C, are of a vertically oriented, prismatic design with one or more inner positive electrodes of FeS or FeS sub 2 , facing electrodes of lithium--aluminum alloy, and molten LiCl--KCl electrolyte. During this fiscal year, cell and battery development work continued at ANL, Eagle--Picher Industries, Inc., the Energy Systems Group of Rockwell International, and Gould Inc. Related work was also in progress at the Carborundum Co., General Motors Research Laboratories, and various other organizations. A major event was the initiation of a subcontract with Eagle--Picher Industries to develop, design, and fabricate a 40-kWh battery (Mark IA) for testing in an electric van. Conceptual design studies on a 100-MWh stationary-energy-storage module were conducted as a joint effort between ANL and Rockwell International. A significant technical advance was the development of multiplate cells, which are capable of higher performance than bicells. 89 figures, 57 tables. (ERA citation 04:036555)

Nelson, PA Barney, DL Steunenberg, RK
Argonne National Laboratories, Department of Energy Nov. 1978, 246 p.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ANL-78-94

11 198453
ENERGY STORAGE SYSTEMS PROGRAM OVERVIEW, FY 1978, COMPILED DECEMBER 1977

Potential applications of energy-storage technologies are found in transportation, building heating and cooling, industrial processes, and the utilities. Fuel substitution resulting from the use of energy storage will reduce the need to import expensive oil and can help reduce environmental pollution. Energy storage will enable electric utilities to use their facilities more efficiently. This increase in efficiency will reduce the need for new plants and transmission facilities, and can contribute to slowing the rate of increase in electricity costs. The use of energy-storage technologies can expedite the commercialization of solar energy by reducing or eliminating the need for backup systems. Four subprograms of the Division of Energy Storage Systems (STOR) are discussed--technical and economic analysis; batteries and electrochemical systems; chemical and thermal programs; and mechanical and magnetic energy storage. Chapter V, Electric Vehicle Applications is followed by a chapter on Utility Applications. The final chapter covers the management plan. (ERA citation 04:026701)

Department of Energy Oct. 1978, 101 p.

ACKNOWLEDGMENT: NTIS
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DOE/ET-0038

11 199046
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. VOLUME 3. LONGITUDINAL CONTROL ANALYSIS AND DESIGN. PART A: SLT AND GRT SYSTEMS

Automated Guideway Transit (AGT) systems are a potential means of providing convenient, dependable, cost-effective urban transportation. Prior to deployment, technical obstacles in the areas of network operation, vehicle control, safety, reliability, and maintainability must be resolved. The Urban Mass Transportation Administration (UMTA) has established the Automated Guideway Transit Technology Program to overcome these obstacles. Since the longitudinal control system encompasses most of the essential vehicle subsystems, it plays a critical role in the guideway operation. The VLCR project addresses those areas where technological improvements at the subsystem level can substantially improve the deployability of AGT systems. This report describes the activities performed in developing single-thread longitudinal control system designs which permit short-headway operation. The study relates to current systems which operate at headways greater than 20 seconds using fixed-block protection as well as systems which operate at headways in the 5-second regime, using moving-block protection. Conclusions and recommendations are included in this report.

See also PB-298767, Part B, RRIS 11 199047; Bulletin 8001.

Petrino, E
Otis Elevator Company, Urban Mass Transportation Administration Final Rpt. OTIS/TTD/VLCR-061-1, UMTA-IT-06-0148-79-7, May 1979, 836 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298766/7ST

11 199047
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. VOLUME 3. LONGITUDINAL CONTROL ANALYSIS AND DESIGN. PART B: PRT SYSTEMS

This report, Volume 3, Part B, documents the analytic design and simulation work performed for the Personal Rapid Transit (PRT) longitudinal control system. The objectives of this study were to develop and evaluate candidate longitudinal control systems for the very-short-headway operation of small transit vehicles. The study included a general view of the state-of-the-art in PRT systems, a detailed evaluation of applicable operating policies for such systems, an evaluation of available control design techniques, and an assessment of key hardware implementation issues. The major conclusion of this study is that PRT systems with time headways as low as 0.5 second appear to be feasible. It was found that conventional operating policies are not appropriate for such systems, but that alternate policies can be defined which assure safe and efficient system operation. One such alternative, the "safe-approach" policy, was developed in the course of the study. The study addresses the "safe-approach" policy develops a controller, and proceeds to analyze and test the controller via simulation. The longitudinal controller operated satisfactorily at a headway of 0.5 second for steady-state, overtake, and other maneuvers, as shown by the extensive simulation results which are included. Appendices are included which derive acceleration profiles, contain simulation source code, evaluate key PRT technology issues, and present and discuss a conceptual control system implementation.

See also report dated Feb 79, PB-297129, and PB-298766.

Schumacher, P
Otis Elevator Company, Urban Mass Transportation Administration Final Rpt. OTIS/TTD/VLCR-061-2, UMTA-IT-06-0148-79-8, May 1979, 178 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298767/5ST

11 199053
STUDY ON HYDROSTATIC DRIVES FOR SMALL AGT VEHICLES
This report presents an analysis of hydrostatic drives applicable as propelling units for Automated Guideway Transit (AGT) small vehicles. The study includes a comprehensive state-of-the-art survey of hydrostatic drive units and the development, design, and performance requirements for a 15 HP hydrostatic drive propulsion system for an AGT system. The study included a series of testing on a 15 HP unitized hydrostatic unit to evaluate performance characteristics and acoustic noise. Acoustic noise of hydraulic equipment, especially the hydrostatic drive, has been studied and the findings reported herein. A series of tests were performed on the unitized 15 HP hydrostatic drive to simulate an AGT small vehicle duty cycle using a 20 and 29 GPM hydraulic motor. These tests were conducted on an eddy-current clutch dynameter, 35 HP capacity, and utilized specially designed and developed processor to produce the simulated duty cycle during the tests. In addition, noise level tests were performed on the unitized hydrostatic drive with the 20 and 29 GPM hydrostatic motor and applied with and without shield constructed as a box to dampen hydrostatic drive noise. Also, a trade-off analysis comparing the hydrostatic drive unit with the AC electric drive motor with eddy-current clutch/brake and DC electric motors for application as AGT vehicle propulsion system was done.

Adams, GJ Hoover, LR
Mobility Systems and Equipment Company, Urban Mass Transportation Administration, (UMTA-CA-06-0089) Final Rpt. MSE-0277/1, UMTA-CA-06-0089-78-1, Oct. 1978, 121 p.

Contract DOT-UT-60043

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298805/3ST

11 199067
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 5: EVALUATION MODELS
The objective of the Automated Guideway Transit (AGT) Guideway and Station Technology Project is to develop guideway, station and weather protection concepts that will improve performance and reduce the cost and implementation time associated with AGT systems. Evaluation models are presented herein which set forth methodologies for the development and evaluation of guideways and stations for AGT systems. The models include concept development and evaluation methodologies for both guideways and stations, a cost model, and an implementation time model. The concept development methodology outlines a step-by-step procedure and describes the work involved in developing guideway and station concepts. This methodology is interwoven with the evaluation methodology so that concepts can be evaluated. The evaluation methodology includes the establishment of evaluation measures and goals including cost and time and a procedure for evaluating concepts in both the schematic design stage and the preliminary design stage. A computerized life-cycle cost model is included to calculate annual costs for capital and operations and maintenance, including power consumption. The cost model includes default values, which can be used by entering a description of the guideway and stations, to obtain an estimate of investment cost by line item and overall annual costs. The implementation time model is presented in the form of bar graphs and network diagrams. Estimates of the time range are presented for each of the eleven major activities involved in implementing guideways and stations. These activities range from predesign planning through acceptance of the work.

See also Volume 4, PB-295613. Prepared in cooperation with ABAM Engineers, Inc., Tacoma, WA., and General Research Corp., Santa Barbara, CA.

Stevens, RD
De Leuw, Cather and Company, ABAM Engineers, Incorporated, General Research Corporation, Urban Mass Transportation Administration, (UMTA-IT-06-0152) Final Rpt. UMTA-IT-06-0152-79-4, June 1979, 269 p.

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299034/9ST

11 199097
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 6: DYNAMIC MODEL
This document is one of an eight-volume final report associated with the AGT Guideway and Station Technology Project. The project is part of the Urban Mass Transportation Administration's Automated Guideway Transit Technology Program. The objective of the project is to develop guideway, station, and weather protection concepts which will reduce the cost and implementation time associated with AGT systems as well as to improve performance. The research is intended to aid planners, designers, administrators, and others as they consider AGT systems and their potential application to satisfy transportation needs in urban areas. This study is limited in scope to AGT systems consisting of rubber-tired, automatically laterally and longitudinally controlled vehicles operating on at-grade and elevated guideway structures. This volume complements Volume 4: Design Guidelines, and focuses upon guideway dynamics and includes consideration of vehicle/guideway interactions in terms of vehicle ride quality and guideway surface profiles at the Fairlane system in Dearborn, Michigan and the Morgantown system in Morgantown, West Virginia. Data reviewed for all AGT systems and measured directly on these two systems include vertical, lateral, and longitudinal motions as well as limited data on roll, pitch, and yaw. The ride quality was determined in terms of accelerations measured at the front, center, and rear of the vehicles along vertical, lateral, and longitudinal axes. The guideway surface profiles were measured with a dual stylus profilometer. The measured ride quality data are compared with results for the AIRTRANS system at Dallas-Fort Worth Airport and with results for other modes including automobiles, buses, and trains. The report concludes that the model ride quality predictions agree reasonably well with the data measured at Morgantown and Dearborn.

See also Vol. 2, PB-281632. Prepared in cooperation with ABAM Engineers, Inc., Tacoma, WA.

Stevens, RD Stilletto, JG Wormley, DN Hedrick, JK
De Leuw, Cather and Company, ABAM Engineers, Incorporated, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0152-79-5, July 1979, 97 p.

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299153/7ST

11 199111
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 7: GUIDEWAY AND STATION CONCEPTS
The objective of the project is to develop guideway, station and weather protection concepts which will reduce the cost and implementation time associated with AGT systems. The purpose of this report is to present concepts for AGT guideways and stations which will minimize overall costs and implementation time. The concepts presented fall into four areas: guideways, stations, power distribution, and contracting methods. The guideway concepts work includes a discussion of various materials and construction techniques and assesses their applicability to AGT. Selected existing AGT guideway designs are examined and modified to reduce costs. Power distribution concepts and costs compare AC and DC power, single versus multi-point incoming service, and basic versus dual-redundant substations. Four baseline station concepts are developed and costed, and sensitivity variations of these concepts are examined. A selected number of the developed guideway and station concepts are evaluated and illustrated through photomontages and models. Fifteen alternative contracting methods for guideways and stations are developed and evaluated.

See also Volume 2, PB-281632. Prepared in cooperation with ABAM Engineers, Inc., Tacoma, WA.

Stevens, RD
De Leuw, Cather and Company, ABAM Engineers, Incorporated, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0152-79-6, July 1979, 418 p.

Contract DOT-UT-70066
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299411/9ST

11 199118
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. VOLUME 4. RELIABILITY ENHANCEMENT ANALYSIS AND DESIGN TEST REPORT

The Vehicle Longitudinal Control and Reliability (VLCR) Program is a part of the Automated Guideway Transit (AGT) Technology Program that provides for reliability improvement to be considered a separate task. A summary of reliability enhancement techniques is a part of this task; it is intended to provide a comprehensive body of reliability enhancement information applicable to AGT systems. It is also a step in accomplishing the enhancement of the specific control systems that are being considered in the enhancement of the four generic control system designs. This document is the final report of the Reliability Enhancement Studies for the VLCR Project. It contains the results of the literature search, the development of reliability enhancement techniques, AGT component enhancement, the use of redundancy, enhanced AGT design, and a detailed implementation of selected VLC systems. In this report, techniques for enhancement are listed in terms of their applicability of a system's hardware tier level, beginning with those that are applicable to the component level, to the subsystem level, and to the systems level. The documents annotated in Appendix I (Annotated Bibliography of Applicable Reliability Documents) represent only those which have information directly applicable to the VLCR project. The objective of this Reliability Enhancement Task is to develop techniques to enhance the reliability of VLC systems, and it includes an extensive survey of reliability enhancement techniques previously employed by U.S. Government and Industry programs.

See also report dated Feb 79, PB-297129, Volume 3, Part A, PB-298766, and PB-299526.

Womack, WC
Otis Elevator Company, Urban Mass Transportation Administration, (UMTA-IT-06-0148) Final Rpt. OTIS/TTD/VLCR-069, UMTA-IT-06-0148-79-9, May 1979, 321 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299525/6ST

11 199119
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. LONGITUDINAL AND LATERAL CONTROL COST AND WEIGHT MODEL

UMTA's Automated Guideway Transit Technology (AGTT) Program is oriented toward the analyses of systems and the development of system elements which may be used in a variety of advanced urban transportation systems. The Vehicle Longitudinal Control and Reliability (VLCR) Project is the part of the AGTT program that focuses on the performance of longitudinal control systems. The project includes a review of the status of existing technology, specification of design goals and requirements, detailed mathematical modeling, analysis and simulation, development and specification of design concepts and their mechanizations, and experimental validation of the designs. This document describes an automated cost and weight model for Vehicle Longitudinal and Lateral Control (VLC) Systems. The model is a life-cycle cost and weight model which focuses on system components which vary with lateral control option. This model is to be used to evaluate the cost and weight of VLC designs for four classes of AGT (GRT) large and small, and Personal Rapid Transit (PRT). The report is organized in three technical sections: (1) Methodology and model description (includes design goals, model structure, basic equations, and a detailed description of the model; (2) Model use (includes input requirements, output and factor selection; and (3) Model growth potential. Conclusions are provided in the last section with the model code reproduced in the Appendix. The authors state that a usable life-cycle cost and weight model is available for immediate application to AGT nominal designs and control alternatives.

See also report dated Feb 79, PB-297129, and PB-299525.

Womack, WC Graver, CA
Otis Elevator Company, Urban Mass Transportation Administration, (UMTA-IT-06-0148) Final Rpt., 1 OTIS/TTD/VLCR-063, UMTA-IT-06-0148-79-1, June 1979, 150 p.

Contract DOT-UT-70048
ACKNOWLEDGMENT: NTIS
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PB-299526/4ST

11 199122
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 1: EXECUTIVE SUMMARY

This volume presents a summary of the work accomplished under the AGT Guideway and Station Technology Project. The summary reflects the work reported in the other seven volumes of this final report and includes the following topics: (1) weather protection review; (2) guideway and station review; (3) design guidelines; (4) evaluation models; (5) dynamic model; (6) guideway and station concepts; and (7) weather protection concepts. The volume also includes a brief introduction and a statement of the overall results of the project. Potential savings of up to 20 percent over the costs associated with existing AGT systems are identified. The summary provides a description of the state-of-the-art as evidenced by existing guideways, stations, and weather protection methods; models and guidelines to assist planners and designers of AGT systems; and approaches that will reduce the cost of guideways, stations, and weather protection.

Prepared in cooperation with ABAM Engineers, Inc., Tacoma, WA. See also Volume 2, PB-281632.

Stevens, RD
De Leuw, Cather and Company, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0152-79-8, Aug. 1979, 141 p.

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299553/8ST

11 199123
A QUANTITATIVE EVALUATION OF SERVICE-DEPENDABILITY MODELING APPROACHES FOR AUTOMATED GUIDEWAY TRANSIT

Automated guideway transit (AGT) systems, which are intended to operate without vehicle and station personnel, are controlled remotely from a central operations area. Such an operational concept has focused the attention of system planners and designers on the impact of equipment malfunctions and the means for adapting system operations to carry on service in the face of a malfunction, while simultaneously removing the cause of the malfunction and restoring normal service. Dependability modeling attempts to develop quantitative relationships that express the effects on passenger service brought about by network configuration, operations policy, equipment malfunction characteristics, and recovery-system design characteristics. The purpose of this study is to provide a quantitative assessment of several different types of models to identify their applicability, data requirements, and computational cost. A case-study approach was used whereby a specific test scenario was defined, and each model to be evaluated was applied to the scenario. Quantitative comparisons require that the models provide estimates of the same set of performance measures and be executed in a similar computer environment. The modeling approaches were modified to meet this requirement, were programmed in the PL/1 language, and were operated as executable load modules on the IBM 360/91 computer to obtain computational cost estimates.

Roesler, WJ Haberman, S Chiu, HY
Johns Hopkins University, Laurel; Urban Mass Transportation Administration Tech Rpt. APL/JHU-CP-071TPR043, UMTA-MD-06-0025-79-1, May 1979, 117 p.

Contract DOT-UT-70036

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299584/3ST

11 199124
LIFE CYCLE COSTS AND APPLICATION ANALYSES FOR NEW SYSTEMS

This paper reflects the view that both the accelerating walkway (AW) and the automated mixed traffic vehicle (AMTV) system can provide service for short urban trips. In this paper, estimated life cycle costs of the two promising feeder and local circulation systems, AW and AMTV, are examined. Cost functions for the AW and the AMTV are described; their

sensitivity to some of the design, operating and cost parameters is examined. The two systems are placed in the context of hypothetical applications to identify typical user costs.

Presented at the Conference on Automated Guideway Transit Technology Development Held at Boston, Massachusetts on February 28-March 2, 1978,

Lenard, M
Mitre Corporation, Urban Mass Transportation Administration, (UM-TA-VA-06-0041) Conf Paper MTR-7858, UMTA-VA-06-0041-78-2, May 1978, 28 p.

ACKNOWLEDGMENT: NTIS
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PB-299586/8ST

11 300564
JNR'S MAGLEV: CLOSER TO COMMERCIAL PRACTICALITY?
Activity of the Railway Technical Research Institute of Japanese National Railways on magnetic levitation, including tests on a 4.4-mile test guideway on Kyushu, are described. JNR has developed a vehicle-mounted cooling system for superconducting magnets and with linear motor propulsion is to operate at 500 km/h with a test vehicle.

Middleton, WD *Railway Age* Vol. 180 No. 15, Aug. 1979, pp 32-33, 2 Phot.

ORDER FROM: ESL

DOTL JC

11 300628
LINEAR SYNCHRONOUS MOTOR FOR URBAN TRANSIT USING RARE-EARTH MAGNETS
A track-powered propulsion system for automated urban transit vehicles is described. It is a linear synchronous motor which is similar in principle to the motor previously designed for the Canadian 500km/h Maglev system. The urban vehicle has an array of samarium-cobalt magnets fixed to a backing plate on the underside of the vehicle. These magnets interact with insulated aluminum cables imbedded in the track surface and carrying variable-frequency current supplied from periodically-placed track-side inverter stations. No iron is used in the track. The vehicle is suspended on wheels. The air gap clearance between the vehicle magnets and the track surface is about 40 mm. A typical design is considered in which the propulsion system, operating at maximum power output of 240 kw, has an efficiency of 77% and a power factor of 88%, using inverters with 2100 m spacing. The system appears to have excellent technical and control features. Its economy will depend on the future cost of rare-earth magnet material.

INTERMAG (Int Magn) Conference, Florence, Italy, May 9-12, 1978.

Slemon, GR (Toronto University, Canada); Burke, P Terzis, N *IEEE Transactions on Magnetics* Vol. MAG-14 No. 5, Sept. 1978, pp 921-923, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

11 300629
SIMULTANEOUS CONSIDERATION OF FINITE LENGTH AND FINITE WIDTH OF LINEAR INDUCTION MOTORS
This paper compares the performances of single-layer and double-layer motors. It establishes the expression of thrust in the form of an integral. An arbitrary extension of the magnetic circuit in the direction of motion is used in two different ways, which are compared. The finite width of the secondary, and the curvature of the secondary current lines are considered. Forces normal to the air gap are evaluated. The mathematical method is use of the Fourier transform in such a way that the properties of every wavelength are considered.

IEEE Power Engineering Society, Winter Meeting Preprint, New York, New York, February 4-9, 1979.

Poloujadoff, M Morel, B
Institute of Electrical and Electronics Engineers Paper F 79 255-1, 1979, 9 p., 29 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

11 300632
ADVANCED FLUID POWER CONTROLS ON MORGANTOWN PEOPLE MOVER
The Morgantown People Mover or MPM has been in operation long enough to have demonstrated very high reliability and availability even when winter storms have crippled all other forms of transportation. The MPM consists of a fleet of electrically powered, rubber tired vehicles which operate on a dedicated concrete guideway. Hydraulic system provides power for both steering and braking operations. A closed loop braking system provides a precision braking with light reliability.

Proceedings of the National Conference Fluid Power, 34th Annual Meeting, Philadelphia, Pennsylvania, November 7-9, 1978.

Keller, GR (Boeing Aerospace Company); Gilliland, RG Illinois Institute of Technology Vol. 32, 1978, pp 95-99

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 300634
OPERATIONS STUDY OF AN INTERMEDIATE CAPACITY TRANSIT SYSTEM ON A HYBRID COMPUTER
A combined discrete-continuous model of an intermediate capacity transit system has been developed to be run on a hybrid computer for the purpose of studying the operation of the system.

Proceedings of the Joint Automatic Control Conference, Philadelphia, Pennsylvania, October 15-20, 1978.

Graefe, PWU (National Research Council of Canada); Crate, GF Chan, AW
Instrument Society of America Vol. 3 1978, pp 271-280, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: Instrument Society of America, 400 Stanwix Street, Pittsburgh, Pennsylvania, 15222

11 300730
STUDIES ON PASSIVE MAGNETIC DAMPING IN THE REPULSIVE MAGNETIC LEVITATION SYSTEM
A magnetic levitation system utilizing superconducting magnets is now being developed for a high speed ground vehicle. The damping force for the mechanical oscillation of a levitated vehicle is one of the major problems in this system from a viewpoint of ride quality or dynamic stability. This paper presents the experimental results of the passive magnetic damping force using a rotary test equipment and compares those with analytical values.

Fujiwara, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 4, Dec. 1978, pp 191-192

ACKNOWLEDGMENT: British Railways
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

11 301140
THE METHOD OF TRAVEL FOR THE DUAL MODE BUS. PARTICULAR ENGINEERING PROBLEMS IN A NEW TRANSPORT SYSTEM [Der Fahrweg fuer den Dual-Mode-Bus. Besondere Ingenieuraufgaben bei einem neuen Verkehrssystem]
The dual mode bus can operate in the normal road network and also on rails. When operating within a prescribed rail track, it can be driven either mechanically or electronically. The aims of this new transport system are greater speed, punctuality, increased comfort and economy. Even the construction of the special track, either above the ground or in a tunnel, or even at ground level, is considerably cheaper than for underground railways or even the standard road tramlines. The vehicle is a further development of the standardized types presently used in public transport. Because of the dual drive capability, it can be used both for wide-area coverage and in concentrated regular scheduled systems. It thus unites the advantages of the bus with those of rail-bound public transport vehicles. /TRRL/ [German]

Hahn, V *Internationales Verkehrswesen* Vol. 30 No. 2, Mar. 1978, pp 108-111, 7 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-307805), 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

11 301175
COMPARATIVE MEASURES ON THE RIDING STABILITY BETWEEN NEW AND CONVENTIONAL SHORT DISTANCE MEANS OF TRANSPORT [Vergleichende Laufruhemessungen an neuartigen und konventionellen Nahverkehrsmitteln]
Comparative measurements have been made in the United States and in Federal Germany at the request of the Federal Ministry for Research and Technology, in order to assess the riding stability of the recent automatic guideway transport. Tests have shown that both the systems with "H" type cabins and cabin taxis, gave results as satisfactory as railway transport. Results are less satisfactory for the bus and the American systems with tracked cabins, i.e. the "Morgantown-PRT" and "AIR TRANS" types. [German]

Bamberg, W Ludwig, H *Nahverkehrspraxis* Vol. 27 No. 4, 1979, pp 155-160, 8 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Arnold Verlag, Siegburg Strasse #5, 4600 Dortmund, West Germany

11 301189
HIGH SPEED GROUND TRANSPORT FOR 21ST CENTURY
High-speed tracked travel in the future is going to depend more on levitation than on the wheel-on-rail systems we know today, states the author, reviewing some of the practical attempts at maglev travel for the future.

Haydon, N *Electrical Review International* Vol. 204 No. 22, June 1979, pp 12-13, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: IPC Business Press Limited, 35 Perrymount Road, Haywards Heath, Sussex, England

11 301198
DEVELOPMENT OF MAGNETIC LEVITATION VEHICLES [Gegenwaertiger stand und Entwicklungstendenzen im bau von Magnetkissenfahrzeugen]
A survey is given of current trends in development in a rapid transit system using cars with repulsive magnetic levitation both for short and long distance lines. [German]

Dannehl, A *Technik* Vol. 34 No. 4, Apr. 1979, pp 197-201, 25 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 301199
STRUCTURES ON EXPERIMENTAL LINE OF JNR'S MAGNETIC LEVITATION SYSTEM
The Japanese National Railways (JNR) commenced the development of the magnetic levitation system super-speed train driven by a linear motor, which can run at higher speed but cause less public nuisance. The major aim of the experiments on the experimental line in Miyazaki Prefecture is to obtain data for substantiating the theoretical analysis essential to the technical development of the levitation system. The subjects of experiments conducted include the items of the guide-way system for the confirmation of the running capacity of the runway and the strength of the various members, the items of the structure system for the confirmation of the adaptability of the structure for supporting the runway, and those of the environment system. The outline of this experimental line is shown.

Niwa, T (Japanese National Railways); Kuwahara, Y *Civil Engineering in Japan* Vol. 17 1978, pp 47-69

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 301202
DC BRAKING CHARACTERISTICS OF DOUBLE-SIDED LINEAR INDUCTION MOTORS
An analysis of dc braking performance of linear induction motors is presented. Specific phenomena such as longitudinal end-effects and transverse edge-effects are taken into account. Computed results are compared with test results available for the dc braking characteristics of the existing largest double-sided linear induction motor.

Boldea, I Nasar, SA *Electric Machines and Electromechanics* Vol. 3 No. 3-4, Apr. 1979, pp 325-332, 5 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 301573
FUNDAMENTALS OF PERSONAL RAPID TRANSIT
This book summarizes the work on Personal Rapid Transit (PRT) carried out at the Aerospace Corporation from 1968 to 1976. It is intended as a reference for experts and a text for students of transportation engineering. Emphasis is on describing concepts rather than engineering details. PRT is an automated taxicab system, a public transit system of 3- to 6-passenger vehicles operating automatically on a network exclusive guideways separate from street and pedestrian traffic. The book reports on both theoretical studies about economics, networks, traffic management, vehicle propulsion and control and also on experiments testing concepts of propulsion and control.

Irving, JH Bernstein, H Olson, CL Buyan, J
Lexington Books No Date, 332 p., Figs., Tabs., 2 App.

ORDER FROM: Lexington Books, Heath (DC) and Company, Lexington, Massachusetts, 02173

DOTL TA1207.189

11 301600
PATRONAGE ESTIMATE FOR DOWNTOWN PEOPLE MOVERS
To provide some guidance in the early planning and conceptual design of downtown people movers, a rough, aggregate approach was developed for determining the effects on ridership of major downtown people movers design and policy decisions. The approach is an abstract, parametric analysis that uses aggregate relations and simplified assumptions to show how ridership of downtown people movers is influenced by (a) alternative downtown people movers design configurations (i.e., such factors as number of stations and station spacing), (b) operating characteristics and policies (i.e., such factors as speeds, headway, and fare), and (c) the size, density, and distribution of activities in the central business district. Trips in five categories are examined separately for possible diversion to downtown people movers: regional trips to the central business district by automobile and transit and internal central business district trips by automobile and transit and internal central business district trips by automobile, transit, and walking. The many combinations of site, system, and service variables tested allow general implications to be drawn from the numerical results. Among the most important are the following: (a) station spacings below or above the 366-488-m (1200-1600-ft) range begin to be less efficient; (b) systems that interface with regional transit at a central business district fringe station divert more transit passengers than does a central delivery arrangement, except in large, spread central business districts; (c) parking fees and capacities at downtown people movers stations are major factors in potential diversion of automobile users to downtown people movers; and (d) downtown people movers service policies have less effect on ridership than fares, except where downtown people movers are in competition with the local central business district bus. /Author/

This paper appeared in Transportation Research Record No. 708, New Transportation Systems and Technology-1979.

Zupan, JM (Regional Plan Association); Ward, DE (Transportation Systems Center); Paules, GE (Urban Mass Transportation Administration); Shladover, SE (Systems Control, Incorporated) *Transportation Research Record* No. 708, 1979, pp 1-8, 6 Fig., Refs.

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11 301601
DEVELOPMENT OF EFFICIENT CENTRAL MANAGEMENT STRATEGIES FOR ADVANCED GROUP RAPID TRANSIT SYSTEMS
This paper presents a summary of a computer-aided method for developing efficient central management system strategies for advanced group rapid transit systems by use of medium-sized, automatically controlled vehicles that travel on dedicated guideways. Some efficient central management system strategies developed for a test network that uses the method are presented and discussed in detail. The method consists of an iterative process in which experienced transit system operators make complex, judgmental decisions and a computer performs extensive and repetitive computations. This computer-aided method allows transit system operators to compare the consequences of various central management system strategies in terms of

such measures as passenger wait times, number of passenger intermediate stops, vehicle fleet size, vehicle load factor, and vehicle flows in various guideway sections and at various passenger stations. After studying such measures, operators can develop a set of efficient and realistic central management system strategies. The computer-aided method and the associated computer simulation program are general in nature and can be used to develop central management system strategies for a variety of network configurations and trip demand data. /Author/

This paper appeared in Transportation Research Record No. 708, New Transportation Systems and Technology-1979.

Siddigee, W Wong, PJ Nielsen, NR (SRI International) *Transportation Research Record* No. 708, 1979, pp 8-16, 8 Fig., 4 Tab., Refs.

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11 301716
APPLICATION OF THE "MAGNETIC WHEEL" IN HIGH-SPEED MAGNETIC LEVITATION RAILWAYS [Anwendung des "Magnetischen Rades" in Hochgeschwindigkeitsmagnetschwebebahnen]

The electromagnetic support and guidance system for magnetic levitation railways consists of electromagnets on the vehicle and an armature rail on the track. The experience gained in the operation of the experimental vehicles so far built, especially with the component test carrier (KOMET), have led to the development of a modular structure for the support and guidance system which uses the "magnetic wheel" as a self-contained functional unit. This concept has made possible a higher reliability by functional redundancy and an improvement of the dynamic characteristics of the vehicle/track system. The results show that the system can be economically used to solve transport problems involving speeds of about 400 km/h.

Gottzein, E *Glasers Annalen ZEV* Vol. 103 No. 5, 1979, pp 227-232, 2 Tab., 11 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

11 301828
FREIGHT PIPELINE, RAIL, AND TRUCK COST COMPARISON

This paper describes the use of four models for comparing the cost of transporting manufactured products via freight pipeline, truck, truck on flat car (TOFC), and rail carload. It was found that cost comparison is sensitive to the transportation configuration, i.e., location, transport distance, and the number of terminals, annual tonnage, the size of shipment, the design of pipeline system, access conditions, and accounting procedure. The study shows that, based on the annualized cost methodology, the transport cost per ton-mile via freight pipeline is cost competitive with truck, rail, and TOFC for four of the five configurations within the Philadelphia-Chicago transportation corridor if the annual tonnage is high. For the fifth configuration, truck is clearly a less expensive mode. However, based on the project's present value methodology, pipeline is cost competitive in all five configurations. Based on the annualized cost methodology, pipeline becomes reasonably attractive for three configurations and for one configuration it compares very favorably (2.7 cents/ton-mile for pipe vs. 2.8 cents/ton-mile for T-R combination).

Zandi, I (Pennsylvania University, Philadelphia); Warner, JA Mersky, R *ASCE Journal of Transportation Engineering* Vol. 105 No. 4, July 1979, pp 411-425, 12 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

11 301848
SIEMENS/DUEWAG H-BAHN SYSTEM

The design and operation of a high-level narrow slotted box beam rapid transit system using suspended vehicles of various sizes is discussed. The elevated beam guidance arrangement can be quickly erected but is usually best suited to modern surroundings as it is visually intrusive. Box section track beams provide a protective envelope for the traction equipment, running surfaces and points. Support columns are needed at 30 M intervals on straight and 20 M intervals at curves and points. Vehicle sizes can vary from small 8 seater cabins to articulated vehicles with room for 50 seated and 152 standing passengers. The vehicles are controlled automatically at three levels. Vehicle headways, speeds and point operations are monitored at the safety level; traffic control level uses station computers and data transfer equipment between stations. The operations control level serves the system as a whole, monitoring the technical equipment and providing communications with vehicles.

Taplin, MR *Modern Railways* No. 5, 1979, pp 44-45, 3 Fig., 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 241519)
ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

11 302143
A NOTE ON COMPARISONS OF COST EFFECTIVENESS IN AUTOMATED GUIDEWAY TRANSIT SYSTEMS

An equation is developed for comparing the cost per trip of alternative transit systems. Equations for the portion of the cost per trip due to vehicle capital cost and due to operation and maintenance costs are derived in terms of easily identifiable system parameters to assist both in quantitative estimates and in understanding how to minimize cost. Particularly in the case of operation and maintenance costs, it is shown that common intuitive evaluations of cost comparisons may be wrong.

Anderson, JE *Journal of Advanced Transportation* Vol. 13 No. 1, 1979, pp 81-86

ACKNOWLEDGMENT: British Railways
ORDER FROM: Institute for Transportation, Incorporated, 1410 Duke University Road, Durham, North Carolina, 27705

11 302175
EVOLUTION OF AIRTRANS--A SUCCESSFUL AGT SYSTEM

The AIRTRANS automated guideway transit (AGT) in operation at Dallas/Fort Worth (D/FW) Airport is the largest and most sophisticated AGT system in revenue service today. The system covers 12.83 miles of guideway, 14 passenger and 14 employee stations and 33 interlocking diverge switches. There are five passenger and four employee routes. There are a total of 51 passenger vehicles (31 lead and 20 trail) which are operated in one and two vehicle consists to provide an average of 25 trains (allowing 6 spares) in service at any one time. The vehicles are controlled by a conventional "fixed block" headway control system which is monitored and supervised by a distributed computer surveillance system. To date the system has accumulated over 16 million vehicle miles and 22 million passenger trips with a system availability above 99%. In the 1974-1976 time period several independent assessments indicated improvements which would be required to successfully deploy AIRTRANS in an urban environment. Utilizing these data, a program designated "AIRTRANS Urban Technology Program" was defined and initiated by UMTA in December 1976. This program, conducted in two phases, will result in the demonstration of an improved, higher performance, urban deployable vehicle at D/FW Airport in October 1979.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Schultz, CM (Vought Corporation)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 392-395

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

11 302176
CONTROL SCHEME OF VEHICULAR STRINGS

The upper controls vehicular strings and the lower controls individual vehicles. In the vehicular strings control system, the mathematical model is built as a discrete linear-state regulator problem where delay time is chosen as state variable and deviation from scheduled driving time between adjacent stations is chosen as control variable. The performance index is defined as a quadratic form concerning the delay time, the deviation from the time interval and the deviation from the driving time. It is possible to realize any vehicular string control system with various objectives by selecting the relative importance of the weighting coefficients of the first and the second terms in the performance index. The controller of the individual vehicle is called AVO (automated vehicular operation) and its two main functions are to drive a vehicle between stations in the time commanded by the vehicular string controller and to keep an accurate stoppage position at a station. The problem of controlling vehicles is modelled as a discrete linear-state regulator problem, where the deviations from both scheduled time and velocity are chosen as state variables and the deviation from any scheduled

driving force is chosen as control variable. The performance index is defined as a quadratic form concerning the state variables and control variable.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Handa, S
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 364-369

ACKNOWLEDGMENT: EI
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11 302177
CONSTANT SEPARATION CONTROL LAW FOR USE IN AUTOMATED GUIDEWAY TRANSIT

This report describes a control method for operating a string of vehicles under a constant separation policy which does not result in string instability. Each vehicle, rather than only looking at the preceding vehicle, also receives a velocity command which is common to all vehicles. The feedback controller is split into two parts, one to control based on vehicle separation error and the other to control based on velocity error. By properly apportioning the feedback gain between these two paths, string instability is overcome. A simulation of a five vehicle string demonstrates the validity of the technique.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Paper, Arlington Heights, Illinois, March 27-30, 1979.

Foster, ER (Draper (Charles Stark) Laboratory)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 358-362

ACKNOWLEDGMENT: EI
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11 302179
VEHICLE DATA ACQUISITION SYSTEM FOR THE SATELLITE TRANSIT SYSTEM

Since 1973 the Sea-Tac International Airport has been operating a subway system. It provides transportation between the main terminal and the two satellite terminals through two independent underground loops. This paper outlines the operation of the electronic vehicle control system. A description is then given of a vehicle data acquisition system which monitors vehicle performance so that faults can be located quickly and, as a result, faulty vehicles can be returned to use faster than when ordinary troubleshooting techniques are used.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Stutz, P (Port of Seattle)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 259-264

ACKNOWLEDGMENT: EI
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11 302180
PASSENGER SERVICE DEPENDABILITY ASSESSMENT

For automated guideway transit systems an increasing concern is the probability of passenger delay and its relationship to system availability. For a loop configuration a particular reference response to a failure is hypothesized. For this reference response, the delay probability equation is approximated simply as "lack of availability" divided by "lack of passenger saturation." Alternate failure responses are then placed in perspective by scaling relative to the reference.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Schaaf, RW
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 204-211

ACKNOWLEDGMENT: EI
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11 302181
ELECTRIC POWER DEMAND OF MULTI-VEHICLE AGT SYSTEMS

This paper describes a computerized model which calculates the power demand in a multi-vehicle guideway transit system. The purpose of the model is to find the total complex power demand from the electric utility at selected times and to find the voltage fluctuation at the individual vehicles. The model is also designed to show the impact of relocating the interconnections between the electric utility and the guideway system. The model is modular so that the guideway deployment and vehicle propulsion systems can be channelled. Preliminary results are given using a fleet of fifteen vehicles in a line-haul guideway deployment. The feasibility of an iterative Newton-Raphson solution to the resulting set of nonlinear simultaneous equations is demonstrated.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Williams, GH (Union College); Flanders, R
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 196-199

ACKNOWLEDGMENT: EI
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11 302182
ASIM, THE AIRTRANS SIMULATION MODEL

The AIRTRANS Simulation Model (ASIM) is a computer model which simulates the operation of automated guideway transit vehicles that are in use at the Dallas/Fort Worth Regional Airport. This model enables study of different routes or expansion of the guideway to obtain accurate performance characteristics of the system at modest cost. This paper describes the development of this model from its first use in 1971 to the current studies that have just been completed.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Jones, GM (Vought Corporation)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 192-195

ACKNOWLEDGMENT: EI
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11 302183
FIVE GENERATIONS: SKYBUS TO ORLANDO

In the mid 1960's, the first real people mover, called Skybus, was developed and tested on a two-mile test track near Pittsburgh. Since then, three such systems have been placed in service and two others are presently under construction. The people mover system at Orlando International Airport will be the 5th generation. It will benefit from all the experience gained in the last twelve years. The new airport will be constructed on the existing site and will consist of a landside terminal and two airside terminals. Each airside terminal is connected to the landside terminal by a curved aerial roadway, approximately 1,940 feet long. Each guideway has two separate and independent roadways with concrete running pads and a center guidebeam. A standard "Type C" vehicle will operate on each roadway. A second vehicle can be added if passenger volume increases. The electrically propelled, totally automated, air conditioned vehicles will comfortably carry 100 passengers standing and will operate 24 hours a day. The system is designed to carry 4,000 passengers per hour on each roadway--16,000 passengers in all. The vehicles are guided by a single center guidebeam in the roadway. They are locked to the guidebeam and cannot be derailed under any operating circumstances.

Twenty-ninth IEEE Vehicle Technology Conference, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Tucker, JR (Westinghouse Electric Corporation)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 123-129

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11 302728
CABIN RAILWAYS IN GERMAN TOWNS. ASPECTS OF THEIR USE IN PRACTICE [Kabinenbahnen in deutschen Staedten. Aspekte des praktischen Einsatzes]

Proceeding of a seminar on automatic cabin railways organised by the German Transport Science Company Deutsche Verkehrswissenschaftliche Gesellschaft) in Hamburg on 24 and 25 January 1979. Feasibility and profitability studies into new systems based on the work, tests and research done in several Federal German towns. [German]

Weigelt, H *Internationales Verkehrswesen* Vol. 31 No. 3, May 1979, pp 137-145, 6 Phot.

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

11 303179
SHINKANSEN RAILWAY AND LEVITATED-TRAIN RAILWAY
Discussed are the problems of the Shinkansen (New Main Line) railroad system which is about 7000 km long, covers most of the territory of Japan and provides high speed for trains, more than 200 km/h. Also given are the history of development, principles of operation and some particularities of a railway with magnetic levitation which can provide train speed as high as 500 km/h. [Japanese]

Takiyama, M *Japan Society of Civil Engineers, Journal of* Vol. 64 No. 1, Jan. 1979, pp 80-90

ACKNOWLEDGMENT: EI
ORDER FROM: Japan Society of Civil Engineers, 1-chome, Yotsuya, Shinjuku-ku, Tokyo 160, Japan

11 303180
CONSTRUCTION AND CHARACTERISTICS OF LINEAR THYRISTOR MOTORS
The linear thyristor motor has many advantages suited for high-speed trains. Its torque characteristics are similar to those of the dc motor and its torque vs. speed characteristics in the high-speed region are particularly good. The vehicle using LTM can also be suspended partly by LTM and partly by conventional tires. The thyristor commutation of LTM is so simple that the LTM is very reliable and can be controlled very easily. Further, the major part of the energy needed for thrust and levitation is fed from the ground coil and only the small amount of power needed for vehicular coil excitation has to be collected. This paper presents experimental results on the high-speed characteristics of two LTM's, a rotating disk type LTM and a large LTM model car running at 100 km/h.

Umemori, T (Japanese National Railways) *Electrical Engineering in Japan* Vol. 98 No. 1, Jan. 1978, pp 28-36, 12 Ref.

ACKNOWLEDGMENT: EI
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11 303181
POWER SUPPLY AND CONTROL OF LINEAR THYRISTOR MOTORS
A train driven by a linear thyristor motor (LTM) moves by one pitch of the ground coil in every cycle of the power supply voltage. Therefore the vehicular speed is determined by the power supply frequency, and the travel distance is determined by the number of cycles of the supplied power source voltage. This means that the speed and location of the vehicle are monitored and controlled completely by the power supply system. Hence, no information channel is required at least theoretically which connects the vehicle with the ground station. This paper proposes a power supply and control system for LTM and confirms its operating performances using an outdoor loop-type model system with circumferential length of 100 m.

Umemori, T (Japanese National Railways) *Electrical Engineering in Japan* Vol. 98 No. 1, Jan. 1978, pp 96-105, 11 Ref.

ACKNOWLEDGMENT: EI
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11 303183
AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
An overview of the system control structure is presented, and attention is focused on individual vehicle longitudinal and lateral control. A longitudinal and lateral control system which utilizes a fixed guideway reference system has been designed, tested, and developed. The fixed guideway reference system is composed of guideway-mounted measurement markers and an inductive communication link which provides the means for vehicle state error measurement and control. Vehicle status information and longitudinal commands are transmitted to/from the wayside via the inductive link. In addition, measurements of the electromagnetic field surrounding the communication link are used to obtain estimates of vehicle lateral position error with respect to a prescribed path. These vehicle state error measurements are processed by an on-board vehicle computer, and the proper longitudinal and lateral control commands are generated and applied to the appropriate control equipment to effect the necessary longitudinal and lateral control responses.

IEEE Vehicle Technology Conference, 29th, Conference Record Papers, Arlington Heights, Illinois, March 27-30, 1979.

Smisek, RR (General Motors Corporation); Harder, GA
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 57-64

ACKNOWLEDGMENT: EI
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11 303184
STUDY ON THE PERFORMANCE OF NTS VEHICLE STEERING CONTROL SYSTEM
An automated guideway transit system is under construction in Osaka City, Japan. Initial operation is planned for 1981. Performance of the vehicle steering control system is considered. Clearance is intentionally provided between guide wheels and the guide-wall to reduce lateral disturbance of the guide wheels caused by guideway irregularities. A mathematical model is derived for the lateral motion of the vehicle with its front and rear steering linkages interconnected by a rod. The effects of some design parameters of the steering system on the lateral motion of the vehicle are predicted by use of computer. The lateral motion of the vehicle is observed after an ideal disturbance force at the front edge of the vehicle-body for one second. It is found that though, in general, the clearance between guide wheels and guide-wall reduces steering control stability and causes oscillatory lateral motion, the connecting rod between the front and rear steering linkages restrains the oscillatory lateral motion, when the steering control gains of front and rear are chosen appropriately.

IEEE Vehicle Technology Conference, 29th, Conference Record Paper, Arlington Heights, Illinois, March 27-30, 1979.

Abe, M Inque, H Wakasa, N
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 31-36

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11 303185
AIRTRANS STEERING SYSTEM IMPROVEMENTS FOR OPERATION IN AN URBAN APPLICATION
An automated guideway transit (AGT) system called AIRTRANS has operated for the past 5 years providing interterminal transit service for passengers at the Dallas/Ft. Worth Airport. The AIRTRANS system has demonstrated that the concept of a steered, rubber tired vehicle operating automatically in a concrete guideway is sound. Operating experience however indicates the need to improve the AIRTRANS steering system for urban application. Thus, improvements are necessary for the following reasons: reduce parapet wall loads; increase speed and maintain ride quality; and reduce weight and complexity to achieve cost savings and maintainability gains. This paper presents the selection of improvements to the steering system necessary for AIRTRANS to demonstrate the above recommendations. A highly instrumented vehicle was used to obtain forces, accelerations and displacements. Evaluation of baseline data, analysis, and design conceived the following steering concepts: an improved mechanical steering system; a hydraulic power boosted steering system; and a contactless strip follower steering system. Two design improvements to the mechanical steering system: a single guide/switchwheel design, an anti-friction kingpin design, and the three steering concepts are discussed to detail, and their merits relative to loads, speed, and ride quality are evaluated.

IEEE Vehicle Technology Conference, 29th, Conference Record Paper, Arlington Heights, Illinois, March 27-30, 1979.

Hall, VW, Jr (Vought Corporation)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 20-30

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11 303201
SIMULATION OF A HIGH PERFORMANCE PRT CONTROL SYSTEM
In connection with the second phase of the Advanced Group Rapid Transit (AGRT) project, the design of a control system for a high-performance

(3-second headway) Personal Rapid Transit (PRT) system has been refined. The control system utilizes a variable length moving block control algorithm, and features a combination of multiple wayside and vehicle-borne computers that are connected by a wide bandwidth data link to achieve the desired performance. In this phase of the project, a major effort was directed toward developing a highly detailed simulation of the entire control system. This simulation was undertaken to verify that the deployed system would meet previously defined performance specifications. This paper discusses the implementation of the simulation and describes its use in verifying system operation at both macroscopic and microscopic levels. Examples of microscopic operations studied include effects of communication delays and errors on system operation and scheduling of different processes on the same computer. Examples of macroscopic operations studied include the operation of several vehicles merging at a junction, the response of several vehicles in a string during normal station stopping maneuvers, and responses to various failures that require emergency action.

IEEE Vehicle Technology Conference, 29th, Conference Record of Papers, Arlington Heights, Illinois, March 27-30, 1979.

Birnbaum, D (General Railway Signal Company)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 212-215

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11 303203
MAG-TRANSIT--DEVELOPMENT AT BOEING

Mag transit is a combination of magnetic levitation and propulsion for people mover applications. Linear electric motors are used for levitation, propulsion, braking, guidance and suspension. Since there are a minimum of moving parts there is a potential for a substantial increase in system reliability and availability as compared to conventional systems. Modern 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 independently control the speed of the vehicle by a continuously variable excitation frequency to the motors.

IEEE Vehicle Technology Conference, 29th, Conference Record of Papers, Arlington Heights, Illinois, March 27-30, 1979.

Gilliland, RG (Boeing Aerospace Corporation)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 148-157

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11 303205
DPM--APPLICATION OF CURRENT TECHNOLOGY

In April of 1976, the Urban Mass Transportation Administration announced the initiation of a Downtown People Mover (DPM) demonstration program to show the benefits of simple, fully automated transit systems--or people movers. This paper defines the existing people mover technologies which may be used to satisfy program requirements.

IEEE Vehicle Technology Conference, 29th, Conference Record of Papers, Arlington Heights, Illinois, March 27-30, 1979.

Marino, JL (Urban Mass Transportation Administration); Willingham, FL
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 137-147, 18 Ref.

ACKNOWLEDGMENT: EI
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11 303206
MORGANTOWN PEOPLE MOVER SERVICE AVAILABILITY AND O&M COSTS --HISTORY AND PROJECTIONS

The Morgantown People Mover System (MPM) was operated in public service from October 1975 to July 1978. Its fleet of fully automated 21 passenger cars has moved 4.5 million passengers without a single system related passenger injury. A fleet mileage of 1.66 million miles was accumulated during the 33 month Phase IB operational period. The system is now undergoing a substantial expansion and will emerge in July 1979 as the Morgantown People Mover Phase II. The purpose of this paper is to report on two aspects of the MPM System that have not received much attention in the technical literature, system reliability and operating costs. This paper summarizes system reliability in the form of operational availability and operating and maintenance costs for the Phase IB time period and projections of these performance measures for Phase II.

IEEE Vehicle Technology Conference, 29th, Conference Record of Papers, Arlington Heights, Illinois, March 27-30, 1979.

Hacker, RM (Boeing Aerospace Company); Bates, RJ
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 130-134

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11 303260
APPLICATION OF INERTIA WELDING TECHNOLOGY TO STEEL DISC-TYPE FLYWHEELS

The program was established to investigate the feasibility of applying inertia welding to the fabrication of steel flywheel assemblies for transportation application. In the inertia welding process, the weld is accomplished by friction and pressure. The parts are literally spun together. The inertia welding characteristics of three steel alloys (Hy-Tuf, 4340, and D6AC) were determined by welding both solid bars (1-in. OD) and tubular specimens (2-in. OD by 0.1-in.-thick wall). In addition, characteristics of the weld and the weld flash (that material extruded from the weld mating surfaces during the welding process) were evaluated. Results indicated Hy-Tuf and 4340 have good welding characteristics, while D6AC is questionable.

General Electric Company Final Rpt. UCRL-15045, June 1979, 80 p.

Contract W-7405-ENC-48

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: General Electric Company, Corporate Research and Development Department, Schenectady, New York, 12306

11 303589
COAL SLURRY PIPELINE FOR THE NEXT DECADE

In this overview of the coal slurry pipeline industry the significant factors in establishing major coal slurry projects in the U.S. are reviewed from physical, economic, legal and political standpoints. Comparisons are made with other transport modes, primarily unit trains.

Wasp, EJ (Bechtel Incorporated) *Mechanical Engineering* Vol. 101 No. 12, Dec. 1979, pp 38-45, 11 Fig., 4 Ref.

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11 303618
TWO-DIMENSIONAL DYNAMICS OF TRACKED RAM AIR CUSHION VEHICLES WITH FIXED AND VARIABLE WINGLETS

A linearized model of pitch-heave dynamics of a Tracked Ram Air Cushion Vehicle is presented. This model is based on aerodynamic theory which has been verified by wind tunnel and towed model experiments. The ride quality and dynamic motions of the fixed winglet vehicle moving at 330 km/hr over a guideway described by roughness characteristics typical of highways is examined in terms of the rms values of vertical acceleration in the foremost and rearmost seats in the passenger cabin and gap variations at the leading and trailing edges of the vehicle. Optimal regulator theory is employed to design the active suspension system. Predicted rms values of vertical acceleration in one-third octave frequency bands are compared with vertical ISO Specifications. It is shown that marked improvements in ride quality can be obtained with either passive or active suspension systems.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Sweet, LM Curtiss, HC, Jr Luhrs, RA (Princeton University)
American Society of Mechanical Engineers Conf Paper 79-WA/DSC-11, July 1979, 12 p., 8 Fig., 6 Tab., 13 Ref., 1 App.

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11 303857
SLURRY PIPELINES: ECONOMIC AND POLITICAL ISSUES. A REVIEW

In the controversy surrounding the proposal to grant Federal eminent domain to coal-slurry pipelines, the fundamental issue is whether, on

balance, such a grant is in the national interest. The principal subissues (peripheral issues) of economics, water supply and disposal, energy consumption and conservation, employment, safety, and environmental impact are analyzed. It is found that, as compared with unit trains, which are the only immediate alternative for movement of large quantities of Western coal, the pipelines are not against the national interest, except in the case of employment. It is concluded that, on balance, the pipelines are in the national interest and should be granted the power of Federal eminent domain.

Banks, WF
Systems, Science and Software SSS-R-77-3023(Rev.1), Nov. 1977, 185 p.

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11 304063
AN ANALYSIS OF THE ISSUES AFFECTING THE COAL SLURRY PIPELINE MOVEMENT
This thesis contains an examination, analysis, and commentary upon the prospective use of slurry pipelines as a supplemental means of coal transportation in support of the announced United States goal to double coal production by 1985. It examines the rudiments of the slurry industry and traces its growth to the present. A thorough review of the technical, legal, and political aspects of the controversial issues influencing the construction and operations of long distance coal pipelines is presented along with a commentary on the cases for and against slurries. Finally, sets of both general and specific conclusions are offered regarding the potential use of the coal pipelines. (Author)

Williams, FA
Naval Postgraduate School MS Thesis Mar. 1979, 112 p.

ACKNOWLEDGMENT: NTIS
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AD-A070221/7ST

11 304616
AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 8. WEATHER PROTECTION CONCEPTS
The objective of the project is to develop guideway, station, and weather protection concepts which will reduce the cost and implementation time associated with AGT systems as well as to improve performance. In Volume 8, weather protection concepts are presented for guideways associated with AGT systems, with emphasis on minimizing costs and energy consumption while maximizing system operability/reliability during winter weather. The concepts include a comparison of embedded pipe and electric heating systems with varied heated widths, heating densities, and amount of utilization.

See also Volume 2, PB-281632.

Stevens, RD Nicarico, TJ McGean, TJ Easley, SM Easley, TL
De Leuw, Cather and Company, Urban Mass Transportation Administration, (UMTA-IT-06-0152) Final Rpt. UMTA-IT-06-0152-79-7, Aug. 1979, 249 p.

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS
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PB-299746/8ST

11 304618
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. VOLUME 5. VLCR ENTRAINMENT AND PLATOONING ANALYSIS AND DESIGN. PARTS A AND B
The U.S. Department of Transportation's Automated Guideway Transit Technology Program (AGTTP) is directed towards the development of critical technologies which provide the foundation for the successful deployment of Automated Guideway Transit (AGT) systems. The program is not directed towards development of complete deployable systems, but towards system elements which may be used in a variety of advanced urban transportation systems. As part of the AGTTP, a project was established to address two critical areas where technological improvements at the subsystem level can substantially improve the deployability of AGT systems: vehicle longitudinal control and reliability. One of the efforts discussed in this report deals with the longitudinal control aspects of automatic entrainment and platooning concepts. The project objectives were to: (1) develop functional and performance specifications for longitudinal control systems for AGT systems using automatic entrainment or platooning; (2) perform an analytical and experimental evaluation of an automatic coupling and decoupling system suitable for trained vehicle operation and failed vehicle pulling and pushing; (3) establish design concepts and specifications for automatic coupling systems which meet the requirements in a cost-effective manner; and (4) perform an analytical assessment of the platooning concept and establish platooned vehicle operation. Work in this report includes review of status of existing technology, specification of design goals and requirements, detailed mathematical modeling, analysis and simulation, development and specification of design concepts and their mechanization, and some experimental validation of the design. The latter will be reported in Volume 6 of the final report.

See also RRIS 11 197631, Appendix B; Bulletin 8001 and Volume 3, Part A, PB-298766.

Lorenz, D Lindgren, C
Otis Elevator Company, Urban Mass Transportation Administration, (UMTA-IT-06-0148) Final Rpt. OTIS/TTD/VLAC-058, UMTA-IT-06-0148-79-5, Feb. 1979, 534 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299798/9ST

11 304635
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. A REVIEW OF ENTRAINMENT TECHNOLOGY
This report documents the results of a survey of entrainment technology conducted for the VLCR project. The technology review was conducted to evaluate the state-of-the-art in train formation and to identify those areas requiring special attention for Automated Guideway Transit (AGT) systems. The information which is summarized herein was derived through: (1) a literature search and review; (2) discussions with coupler manufacturers; (3) a questionnaire to rapid transit operators; and (4) a study of transit authority coupler specifications. The methods and the results obtained within each of these activities are described within the report. The literature search involved both manual and computerized search techniques. The most applicable documents are listed in the Appendix: "Annotated Bibliography". The discussions with coupler manufacturers allowed the formation of a list of existing coupling equipment applicable to systems and the assessment of potential difficulties in the adaptation of coupling equipment to AGT vehicles. Areas probably requiring significant further development were also identified. A questionnaire dealing with automatic coupling equipment and techniques was then prepared and transmitted to seven transit system operators. Through automatic entrainment and extrainment (or train separation) of individual vehicles, it is hoped that the operational efficiency of AGT systems may be improved. The report concludes, in part, that due to the lack of information in the area of automatic vehicle longitudinal control, the formulation of appropriate concepts in this area will require more original and basic work. The report presents a number of preliminary conclusions.

See also PB-300373.

Schumacher, P
Otis Elevator Company, Urban Mass Transportation Administration Final Rpt. OTIS/TTD/VLCR-059, UMTA-IT-06-0148-79-1, Feb. 1979, 92 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300372/0ST

11 304636
VEHICLE LONGITUDINAL CONTROL AND RELIABILITY PROJECT. A REVIEW OF AGT PROPULSION, POWER CONDITIONING, BRAKING AND POWER DISTRIBUTION TECHNOLOGY
The report assesses the current state of the art of each technology. The review was performed to obtain top level information that can be used by system designers, specification writers, and regional planners as baseline considerations. The main sections of this report are: Section 2 discusses propulsion

motor technology. It concludes information on both dc and ac motors; Section 3 discusses power conditioning options for converting guideway power to a suitable form for the motor being used; Section 4 presents the findings on electrical and mechanical braking; and Section 5 sets forth some power distribution and collection considerations.

See also PB-300372, and PB-297129.

Schumacher, P
Otis Elevator Company, Urban Mass Transportation Administration Final Rpt. OTIS/TTD/VLCR-064, UMTA-IT-06-0148-79-2, June 1979, 78 p.

Contract DOT-UT-70048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300373/8ST

11 304646
OPERATION OF AUTOMATED GUIDEWAY TRANSIT VEHICLES IN DYNAMICALLY RECONFIGURED TRAINS AND PLATOONS (EXTENDED SUMMARY)

This project grew out of a conviction that an automated guideway transit (AGT) system had the flexibility of operating either with individual vehicles or with functional multi-vehicle trains, with the capability of forming (entraining) and splitting (extraining) trains during trips, could offer significant advantages over either single vehicles or fixed train systems for some urban applications. The study serves as a broad-based preliminary evaluation of the potential advantages and disadvantages of entrained AGT. It includes an investigation of the applications for which entrained AGT is well suited, and an assessment of how much capacity improvement it can offer. The study shows that passenger capacity of AGT systems may be 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. The longitudinal control systems needed to effect dynamic en/extrainment with platoon operations at spacings of 30--60 cm are developed herein 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 methods. The "zero gap" merge scheme developed produces dramatic improvement compared with conventional merge strategies.

Shladover, SE
Massachusetts Institute of Technology, Urban Mass Transportation Administration, (UMTA-MA-11-0029) Final Rpt. UMTA-MA-06-0085-79-1, Apr. 1979, 112 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300513/9ST

11 304683
PROCEEDINGS OF THE UMTA R AND D PRIORITIES CONFERENCE (3RD) HELD AT CAMBRIDGE, MA., ON NOVEMBER 16-17, 1978. VOLUME III: AGT AND ADVANCED SYSTEMS WORKSHOPS

The document is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshops on AGT and Advanced Systems. Part I of this report aeals with AGT socio-economic research and AGT applications and includes discussions of the AGT Socio-Economic Research Program, the Morgantown and Airtrans People Movers, and the Downtown People Mover (DPM) Program. Part II--AGT and Advanced Systems and Technologies--contains discussions of the AGT R&D Program, the Advanced Group Rapid Transit (AGRT) Program, and the Automated Guideway Transit Technology (AGTT) program. This volume contains seven resource papers which can be found summarized in Volume I of this report along with summaries of other workshop sessions. Volume I also includes the proceedings of the general sessions and a listing of conference participants.

See also Volume 2, PB-300987, and Volume 4, PB-300989.

American Public Transit Association, Urban Mass Transportation Administration, (UMTA-DC-06-0157) UMTA-DC-06-0157-79-3, Nov. 1978, 90 p.

Contract DOT-UT-70026
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300988/3ST

11 307648
MOMENTS AND FORCE DENSITIES OF THE ELECTRODYNAMIC LEVITATION SYSTEM

Theoretical predictions of the moments and the force density distributions on the superconducting magnet and on the conducting sheet guideway are given for the reference levitation system design proposed for the Canadian maglev vehicle. The theoretical method is based on the Lorentz force, and the solution follows from a combination of the dynamic circuit theory and the EM field theory already developed. Good correlations are found with moments measurements already published. The data from the predictions are important for vehicular mechanics analysis and for mechanical structural design of fastening and bracings.

Ooi, B-T (McGill University, Canada); Jain, OP *IEEE Transactions on Magnetics* No. 3, Vol. MAG-15, May 1979, p 1102, 16 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

11 307649
DESIGN OF SUSPENSION SYSTEMS WITH MAGNETIC LEVITATION

An analytic calculation method for an electromagnetic process in a linear motor is used as a basis for discussing the calculation of forces acting on a dc electromagnet with ferromagnetic core moving uniformly along a thin nonmagnetic metal plate. Formulas are derived for the distribution of eddy current induced in the plate with motion of the electromagnet and the magnetic field in such a system. An algorithm is given for calculating the field appearing when a permanent magnet moves along a conducting plate. Sample calculations of the forces and the eddy-current field in the plate are given.

Tozoni, OV Nikolaeva, NS *Power Engineering (USSR Translation)* Vol. 16 No. 5, 1978, pp 28-35, 20 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 307668
SURFACE TRANSPORT IN THE FUTURE [Nazemnyj transport buduscego]

The article examines the development and introduction of new transport techniques in the USSR: magnetic-levitation and linear-motor systems. It goes on to describe the results of American-Russian collaboration in this sphere. [Russian]

Lukov, BE Rakov, KE *Zheleznodorozhnyi Transport* No. 3, 1979, pp 56-58, 3 Phot.

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

12 156355
OPTIMAL DESIGN FOR SYSTEMS SAFETY USING FAULT TREE ANALYSIS AND DYNAMIC PROGRAMMING
Each design alternative where the safety of a given system is concerned has a probability value for occurrence of an undesirable event (accident) in the system and a total cost. For a given probability value, there is a design that has the lowest total cost and meets this probability. In this paper, a method is presented for finding the optimal design and its total cost without explicitly enumerating all the possible design alternatives. In addition, it is shown how the optimal cost and design change as the acceptable probability level of the undesirable event changes. The problem of selecting an optimal restraint system for a car is presented as an example and is solved by the method.

Kianfar, F (Arya-Mehr University of Technol, Iran) *Journal of Safety Research* Vol. 8 No. 3, Sept. 1976, pp 126-135, 6 Ref.

ACKNOWLEDGMENT: EI (EIX770400329)
ORDER FROM: ESL

DOTL JC

12 191594
RAILROAD ACCIDENT REPORTS. BRIEF FORMAT, ISSUE 2, 1977
The publication contains briefs of selected railroad accidents occurring in U.S. railroad operations during calendar year 1977. The brief format presents basic facts, conditions, circumstances, and probable cause(s) in each instance. Additional statistical information is tabulated by types of accident, and casualties related to types of accidents, carriers involved, and causal factors.

National Transportation Safety Board NTSB-RAB-78-3, Oct. 1978, 129 p.

ACKNOWLEDGMENT: NTIS
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PB-290367/2ST, DOTL NTIS

12 197565
PRESSURE RISE IN A VENTED CARGO TANK DUE TO EXTERNAL HEATING
The normal venting capacity of marine cargo tanks appears to be adequate for relieving vapor generated when integral tanks are exposed to an external fire. However, the unwetted tank walls surrounding the ullage are subject to substantial weakening in those cases where the fire heat flux increases the wall temperature above 1000 deg. F. Convection and radiation can adequately cool the unwetted wall only for incident heat flux less than 16,000 BTU/hr/ft2. Thus, the failure mode of cargo tanks with an external fire may be due not to the vent system, but rather to heating of the unwetted wall. (Author)
Errata sheet inserted.

Wilson, RP Raj, PKP
Little (Arthur D), Incorporated, United States Coast Guard Final Rpt. USCG-D-70-76, Apr. 1976, 80 p.

Contract DOT-CG-42-357-A

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A068311/0ST

12 197827
MINUTES OF THE EIGHTEENTH EXPLOSIVES SAFETY SEMINAR. VOLUME I. HELD AT EL TROPICANO MOTOR HOTEL SAN ANTONIO, TEXAS, ON 12-14 SEPTEMBER 1978
This Seminar is held as a medium by which there may be a free exchange of information regarding explosives safety. With this idea in mind, these proceedings are being provided for your information. The presentations made at this Seminar do not imply indorsement of the ideas, accuracy of facts presented, or any product, by either the Department of Defense Explosives Safety Board or the Department of Defense. (Author)

Department of Defense Explosives Safety Board Sept. 1978, 930 p.

ACKNOWLEDGMENT: NTIS
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AD-A066568/7ST

12 197828
MINUTES OF THE EIGHTEENTH EXPLOSIVES SAFETY SEMINAR. VOLUME II. HELD AT EL TROPICANO MOTOR HOTEL SAN ANTONIO, TEXAS, ON 12-14 SEPTEMBER 1978
This paper presents the results of statistical analyses of data on twenty-five events of explosions in propellant ground handling and transport systems. The results are taken from a soon-to-be published NASA report entitled "Workbook for Estimating Effects of Accidental Explosions in Propellant Ground Handling and Transport Systems," which was prepared for NASA Lewis Research Center by Southwest Research Institute. Estimates of distributions of parameters and relationships between parameters which are useful in risk assessment are presented. Results include fragment weight distribution, mean fragment weight as a function of normalized yield, correlation between fragment range and fragment weight, correlation of fragment range to the ratio or mean fragment weight to vessel weight for cylindrical tanks, and correlation of fragment velocity to the ratio of energy to vessel weight. Tables of the data and graphs of the resultant distributions are included in the paper to support final conclusions. (Author)

Department of Defense Explosives Safety Board Sept. 1978, 953 p.

ACKNOWLEDGMENT: NTIS
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AD-A066569/5ST

12 197983
RAILROAD ACCIDENT REPORT-HEAD-END COLLISION OF LOUISVILLE AND NASHVILLE RAILROAD LOCAL FREIGHT TRAIN AND YARD TRAIN AT FLORENCE, ALABAMA, SEPTEMBER 18, 1978
About 10:31 a.m., c.d.t., on September 18, 1978, Louisville and Nashville Railroad local freight train Extra 542 South collided head-on with L&N yard train No. 101 on the single main track within yard limits at Florence, Alabama. Both locomotive units and one car of each train were derailed. Three train crewmembers were killed. Since an LPG tank car was derailed and oil was spilled from ruptured locomotive fuel tanks, local officials evacuated about 1,000 persons from nearby residences. Total damage was estimated to be $462,500. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer of Extra 542 South to operate his train at a speed that would have permitted stopping the train within one-half the available sight distance as required by L&N operating rules. Contributing to the severity of the accident was the failure of the engineer of Extra 542 South to apply his train's brakes after he was in a position to see the opposing train. Contributing to the collision was the failure of the L&N management to insure that all operating rules were being complied with, particularly those involving the operation of two trains in opposite directions on the same track.

National Transportation Safety Board NTSB-RAR-79-2, Feb. 1979, 36 p.

ACKNOWLEDGMENT: NTIS
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PB-293326/5ST, DOTL NTIS

12 198011
RAILROAD ACCIDENT REPORTS-BRIEF FORMAT, ISSUE NUMBER 1- 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-79-1, Feb. 1979, 172 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293488/3ST, DOTL NTIS

12 198176
TRANSPORTATION SAFETY INFORMATION REPORT. OCTOBER, NOVEMBER, AND DECEMBER 1978 AND ANNUAL SUMMARY
The report is published quarterly. It is a compendium of selected national-level transportation safety statistics for all modes of transportation.

Each report presents and compares figures for transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. Featured in this quarter's report is the annual summary of modal safety hazards and safety program highlights for 1978, as well as charts detailing modal safety trends from 1968-1978.

Paper copy also available on subscription, North American Continent price $30.00/year; all others write for quote.

Gay, WF
Transportation Systems Center Final Rpt. DOT/TSC/P24-78/4, Mar. 1979, 89 p.

ACKNOWLEDGMENT: NTIS
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NTISUB/D/224-004

12 198259
TRANSPORTATION OF RADIOACTIVE MATERIAL IN GEORGIA
Shipments of radioactive materials were surveyed to determine the types of materials, pattern of transportation and magnitude of activity, the extent of compliance with shipping regulations, and the radiation exposure to persons handling the materials. The transported radioactive materials were categorized as radiopharmaceutical packages, packages for industrial, research or educational use, teletherapy and radiography sources, and nuclear fuel cycle shipments. Radiopharmaceuticals constituted the most numerous shipments, but the highest curie amounts were in spent fuel elements. The transportation workers whose radiation dose rates were measured did not receive excessive increments from the radioactive materials, but practices for reducing their radiation doses can be instituted and are recommended.

Sponsored in part by Department of Transportation, Washington, DC. Prepared in cooperation with Georgia Inst. of Tech., Atlanta. Office of Interdisciplinary Programs.

Carter, MW Gasper, JT Kahn, B
Georgia Department of Human Resources, Georgia Institute of Technology, Nuclear Regulatory Commission, Department of Transportation July 1979, 58 p.

Contract NRC-06-77-021

ACKNOWLEDGMENT: NTIS
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NUREG/CR-0931

12 198498
HAZARDOUS MATERIALS TRANSPORTATION. PART 1. GENERAL STUDIES (CITATIONS FROM THE NTIS DATA BASE)
The transportation of explosives, rocket propellants, pesticides, chemical warfare agents, industrial chemicals, liquified natural gas, chlorine, and other hazardous materials are covered. All means of transportation are described. Accidents, injuries, explosions, and spills involving these materials are covered. Material testing and safety equipment are discussed. Economics and statistics of hazardous material transportation are included. Radioactive wastes and materials are excluded. (This updated bibliography contains 313 abstracts, 14 of which are new entries to the previous edition.)

Habercom, GE, Jr
National Technical Information Service July 1979, 320 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0703/3ST

12 198499
HAZARDOUS MATERIALS TRANSPORTATION. PART 2. RADIOACTIVE MATERIALS AND WASTES (CITATIONS FROM THE NTIS DATA BASE)
The bibliography cites studies on the hazards, risks, and uncertainty of transporting radioactive wastes and materials. The design of shipping containers and special labels for identification purposes for transporting fuels and wastes are also cited. Studies are included on legislation dealing with the safety and health of the population and the environmental problems associated with transporting radioactive materials. (This updated bibliography contains 167 abstracts, 27 of which are new entries to the previous edition.)

Carrigan, B
National Technical Information Service July 1979, 174 p.

ACKNOWLEDGMENT: NTIS
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12 198500
HAZARDOUS MATERIALS TRANSPORTATION (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)
Worldwide journal research is cited on transportation of hazardous chemicals, gases, and explosives. The majority of studies concern liquefied natural gas transportation. Tanker ships, containers, and pipelines for these materials are discussed. Descriptions of accidents, spills, handling, loading, and equipment design are covered. Mathematical models and simulations are included. (This updated bibliography contains 238 abstracts, 33 of which are new additions to the previous edition.)

Habercom, GE, Jr
National Technical Information Service July 1979, 244 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0705/8ST

12 198579
RAILROAD ACCIDENT REPORT, REAR END COLLISION OF CONRAIL COMMUTER TRAIN NO. 400 AND AMTRAK PASSENGER TRAIN NO. 60, SEABROOK, MARYLAND, JUNE 9, 1978
About 6:40 p.m., on June 9, 1978, Conrail commuter train No. 400 struck Amtrak passenger train No. 60, which was slowing to stop at a grade crossing at Seabrook, Maryland. Eight cars of train No. 60 and the three head cars of train No. 400 derailed. Sixteen crewmembers and 160 passengers were injured, and damage was estimated to be $248,050. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the engineer of train No. 400 to perceive the train ahead and to properly apply the brakes in sufficient time to prevent a collision. Contributing to the accident was the failure of Amtrak to assure that the train crews were adequately trained. The causes of the large number of injuries in this relatively low-speed collision were the failure to maintain and service seats on the Amfleet equipment, and the injury-producing fixtures designed into the commuter cars.

National Transportation Safety Board NTSB-RAR-79-3, Mar. 1979, 36 p.

ACKNOWLEDGMENT: NTIS
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PB-294710/9ST, DOTL NTIS

12 198685
CHARACTERIZATION OF HAZARDOUS WASTE TRANSPORTATION AND ECONOMIC IMPACT ASSESSMENT OF HAZARDOUS WASTE TRANSPORTATION REGULATIONS
Facilities, transportation activities, business/administrative practices, regulatory environment, and financial and economic structure of transporters of hazardous waste in the United States were considered. In addition, the costs of compliance and economic impact were considered. The EPA-proposed hazardous waste transportation regulations, Section 3003 of the Resource Conservation and Recovery Act (RCRA) were assessed.

Little (Arthur D), Incorporated, Environmental Protection Agency Final Rpt. EPA/530/SW-170C, 1978, 261 p.

Contract EPA-68-01-4381

ACKNOWLEDGMENT: NTIS
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PB-296497/1ST

12 198717
TRANSPORTATION TECHNICAL ENVIRONMENTAL INFORMATION CENTER INDEX
In an effort to determine the environmental intensities to which energy materials in transit may be exposed, a "Data Center" of technical environmental information has been established by Sandia Laboratories, Division 5522, for the DOE Division of Environmental Control Technology. An index is presented which can be used to request data of interest. (ERA citation 04:029412)

Davidson, CA Foley, JT
Sandia Laboratories, Department of Energy Jan. 1979, 53 p.

Contract EY-76-C-04-0789
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

SAND-75-0248D

12 198742
TRANSPORTATION SAFETY INFORMATION REPORT. JANUARY, FEBRUARY, AND MARCH 1979 QUARTERLY HIGHLIGHTS
The report is published quarterly, and is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each report presents current safety data on transportation fatalities, accidents, and injuries on a monthly and quarterly basis over a 2-year period.

Paper copy also available on subscription, North American Continent price $30.00/year; all others write for quote.

Gay, WF
Transportation Systems Center Final Rpt. DOT-TSC-P24-79-1, June 1979, 36 p.

ACKNOWLEDGMENT: NTIS
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NTISUB/E/224-01, DOTL NTIS

12 198994
NORTHEAST CORRIDOR IMPROVEMENT PROJECT TASK 406: GENERAL SAFETY REQUIREMENTS
The General Safety Requirements specifies the safety rules and procedures regulating construction and trackwork for the Northeast Corridor Improvement Project. These rules and procedures are to be followed by Amtrak and all contractors performing work on the Northeast Corridor rail system, and all architect-engineer personnel and other visitors to work sites.

De Leuw, Cather-Parsons and Associates, Federal Railroad Administration Final Rpt. F406-88, FRA/NEPCO-78/10, June 1978, 296 p.

Contract DOT-FR-76048

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298342/7ST; DOTL NTIS

12 300596
RAILROAD ACCIDENT INVESTIGATION REPORTS
This series of periodic reports covers investigations of accidents which government regulation requires be reported to the Federal Railroad Administration.

Federal Railroad Administration 1976, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: FRA

12 300597
RAILROAD EMPLOYEE FATALITIES INVESTIGATED BY THE FEDERAL RAILROAD ADMINISTRATION
Annual report covering employee fatalities which must be investigated in accordance with government regulation.

Federal Railroad Administration 1976, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: FRA

12 300603
HOW SAFE IS SAFE ENOUGH? A PSYCHOMETRIC STUDY OF ATTITUDES TOWARDS TECHNOLOGICAL RISKS AND BENEFITS
Study investigates a technique in which psychometric procedures were used to elicit quantitative judgments of perceived risk, acceptable risk, and perceived benefit for each of 30 activities and technologies. The results indicated little systematic relationship between perceived existing risks and benefits of the 30 risk items.

Fischhoff, B *Policy Sciences* Vol. 9 No. 2, Apr. 1978, pp 127-152, 1 Tab., Refs.

ORDER FROM: Elsevier North-Holland, Incorporated, 52 Vanderbilt Avenue, New York, New York, 10017

DOTL JC

12 300623
3 LPG BLASTS FOLLOW DERAILMENT OF TANKERS, EVACUATION OF AREA
A derailment in a 92-car freight train in the City of Canyon, Texas and fire protection measures used are described.

Rice, J (Fire Department of Canyon, Texas) *Fire Engineering* Vol. 132 No. 3, Mar. 1979, pp 24-26

ACKNOWLEDGMENT: EI
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DOTL JC

12 300665
CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
In an attempt to understand the dynamics of extra severe transportation accidents and to evaluate state-of-the-art computational techniques for predicting the dynamic response of shipping casks involved in vehicular system crashes, a program was organized to investigate these areas. This program, which began in 1975, encompasses the following distinct major efforts. The first of these uses computational methods to predict the effects of the accident environment and, subsequently, to calculate the damage incurred by a container as the result of such an accident. The second phase involves the testing of one-eighth-scale models of transportation systems. Through the use of instrumentation and high-speed motion photography, the accident environments and physical damage mechanisms are studied in detail. After correlating the results of these first two phases, a full-scale event, involving representative hardware, is conducted. To date two of the three selected test scenarios have been completed. Results of the program to this point indicate that both computational techniques and scale modeling are viable engineering approaches for the study of accident environments and physical damage to shipping casks. /Authors/

This paper appeared in TRB Research Record No. 693, Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials.

Jefferson, RM Yoshimura, HR (Sandia Laboratories) *Transportation Research Record* No. 693, 1978, pp 35-44, 21 Fig., 13 Ref.

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DOTL JC

12 300666
SAFE TRANSPORT OF MUNITIONS
The U.S. Department of Defense is conducting a study to determine procedures and methods that are technically and operationally feasible and economically acceptable to prevent, or limit, the effects of explosives incidents in rail cars and mass detonation of containerized munitions in port areas and aboard ships. Selected U.S. Department of Defense components, whose inherent mission, expertise, and physical assets are appropriate to developing solutions, will conduct technical and operational feasibility studies. Each performing agency will coordinate its areas of study with other governmental and industrial organizations. The 13 tasks have been categorized into six major areas of consideration. These include background information, traffic patterns, equipment, fire protection, buffering, and sea containers. The study, including a final report, is programmed to be completed within 33 months, ending in September 1980. The total cost is estimated to be approximately $3 million, which will be funded by both the Army and the Navy. /Authors/

This paper appeared in TRB Research Record No. 693, Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials.

Rudy, BM Ragunas, AM Wong, TKH (Department of Defense) *Transportation Research Record* No. 693, 1978, pp 44-46, 3 Fig.

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DOTL JC

12 300728
AUDISAFE: A GENERAL ACCIDENT-PREVENTIVE DEVICE
Audisafe is an accident preventive device which allows a driver to perceive the nature, the intentions, the distance, the relative speed, and the direction of motion, of potential impending hazards in one simple, unambiguous signal. It is particularly useful in conditions of low visibility. The driver's auditory system is as much an integral part of the device as the electronic hardware. The system is designed to be of use in 15 common accident-contributory situations. The device has additional applications in traffic control, and in areas outside the field of road transport.

Connolley, D *Ergonomics* Vol. 22 No. 2, Feb. 1979, pp 199-210
ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

12 301191
KEEPING CHEMICALS UNDER CONTROL
Moving chemicals is rather like dealing with unexploded bombs-safe enough as long as they are handled expertly- the author looks at the problems.

McGeehan, A *Freight Management* Vol. 13 No. 148, May 1979, pp 17-21, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: IPC Transport Press

12 301593
TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
There are a number of basic classes of transportation safety indices, based on time, event, activity, and population. Each has special utility for certain modes, but they lack a common basis and general applicability. This paper presents a failure index that can be applied to all modes and can allow cross-modal and intramodal comparisons. By using available data, the failure index was calibrated for the case of passenger fatalities. Among the results were that air was found to be less safe than intercity bus or rail for trips of less than 2400 km (1500 miles) and that, for short trips, air is generally less safe than the automobile. The failure index was also used to show how two operators that have the same basic safety performance can appear to differ because of composition of routes (i.e., trip-length distribution). /Author/

This paper appeared in Transportation Research Record No. 709, Transportation System Safety and Project Analysis.

Byun, J (New York City Planning Department); McShane, WR Cantilli, EJ Horodniceanu, M (Polytechnic Institute of New York) *Transportation Research Record* No. 709, 1979, pp 1-6, 7 Fig., 1 Tab., Refs.

ORDER FROM: TRB Publications Off

DOTL JC

12 301594
CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
Transportation accident experience depends on many factors, some very subtle. Although many countermeasures are introduced to enhance safety, it is also true that the accident experience can vary systematically over time even if no countermeasures are introduced. This variation in the baseline is investigated in this paper. How can the average condition vary if no new changes are introduced? Simply put, there are variations built into the total system--operators, roadway, and vehicles. Four major forces are considered in this paper: the changing age distribution of the automobile-driving population; the changing urban-rural balance; changes in modal trip lengths or vehicle types; and modal shifts induced by transportation system management actions. Each of these is found to have a significant effect (5-10 percent on the baseline), and other such forces can also exist. Clearly, it is not valid to explicity or implicitly assume that the baseline does not change. /Author/

This paper appeared in Transportation Research Record No. 709, Transportation System Safety and Project Analysis.

Byun, J (New York City Planning Department); McShane, WR Cantilli, EJ (Polytechnic Institute of New York) *Transportation Research Record* No. 709, 1979, pp 6-10, 4 Fig., 1 Tab., Refs.

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12 301713
SAFETY AS A CRITERION IN THE ASSESSMENT OF TRANSPORT SYSTEMS [Die Sicherheit als Bewertungskomponente von Verkehrssystemen]
The evaluation of transport systems is shown expressed in the form of various equations. Unidimensional cost-benefit analyses are being replaced to an increasing extent by multidimensional analyses of useful value and cost efficiency. Evaluation factors which cannot be expressed in terms of money are determined by means of subjective estimates made by experts. As a generally-acknowledged criterion for evaluation transport systems, safety has been included amongst the evaluation equations represented, though with more or less extensive weighting. [German]

Witte, H *Zeitschrift fuer Verkehrssicherheit* Vol. 25 No. 1, 1979, pp 6-11

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

12 302144
HAZARD CRITICALITY ANALYSIS
During the design of a complex installation it is possible to predict the areas which will cause the major reliability problems. The author describes how such predictions can be made.

Collacott, RA *Engineering* Vol. 219 No. 6, June 1979, pp 791-796

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

12 303259
USE OF A BAYESIAN REASONING IN SAFETY AND RELIABILITY DECISIONS-THREE EXAMPLES
Bayes' theorem is used to quantify the impact of new evidence in three energy-related decision problems. The first problem concerns the risk of radioactivity release during the railroad transport of spent nuclear fuel. This history of shipments thus far is shown to make it highly unlikely that the frequency of release is on the order of 0.001 or greater per shipment. The second and third applications involve predicting the availability performance of new generations of turbine blades. Bayes' theorem is demonstrated as a means for incorporating in the prediction the limited operational data on the new blades along with the experience of the earlier generation and the knowledge of the design changes.

Kaplan, S Garrick, BJ (Pickard, Lowe and Garrick, Incorporated) *Nuclear Technology* Vol. 44 No. 2, July 1979, pp 231-245

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: ESL

12 303262
FRA GUIDE FOR PREPARING ACCIDENT/INCIDENT REPORTS
No Abstract.

Federal Railroad Administration 1979, 80 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: FRA

12 303263
HAZARDOUS MATERIALS TRANSPORTATION: A REVIEW AND ANALYSIS OF THE DEPARTMENT OF TRANSPORTATION'S REGULATORY PROGRAM
No Abstract.

Library of Congress, United States Senate 1979, 251 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

12 304081
GUIDELINES FOR THE PREVENTION OF DANGER IN EXPLOSIVE ATMOSPHERES WITH EXAMPLES
The Guidelines apply to the assessment of danger of explosion when handling materials which can form dangerously explosive atmospheres, and the selection and implementation of measures of protection to prevent such dangers. Handling includes manufacture, processing, destruction, storage and transloading as well as conveyance by vehicles, in pipelines or by other means. These guidelines are not by themselves adequate for an assessment of measures for the prevention of danger from explosive mixtures under other than atmospheric conditions (such as increased pressure or temperature) or with reagents other than air as well as from chemically unstable materials.

Price to members $325.00.

British Standards Institution 1976, 162 p.

ACKNOWLEDGMENT: NTIS
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BTHE-074006

12 304129
A SCOPING STUDY OF SPENT FUEL CASK TRANSPORTATION ACCIDENTS
A scoping study of spent fuel cask transportation accidents was performed to provide an assessment of existing information and to recommend, on a priority basis, the additional information that should be obtained to allow specification of increasingly realistic source terms. The scope was limited to the escape of radionuclides from the cask to the environment resulting from severe accidents. The evaluation of the accident scenarios is as realistic as possible. Information was found to be inadequate to make correlations between accident severity and radionuclide release. Generally, cask and fuel rod thermal-hydraulic data and analytical capability were found to be reasonably adequate; however, data and analytical capability for evaluating structural response to impact are not. Radionuclide behavior information is adequate for noble gases but generally inadequate for most volatile radionuclides and for fuel particulates.

Rhyne, WR Ritzman, RL Cothran, HE, Jr Allgeier, JP Barton, CJS
Science Applications, Incorporated, Nuclear Regulatory Commission SAI/OR-79-140-04, June 1979, 160 p.

ACKNOWLEDGMENT: NTIS
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NUREG/CR-0811

12 304170
DEVELOPMENT OF AN EMERGENCY RESPONSE PROGRAM FOR TRANSPORTATION OF HAZARDOUS WASTE
There exists a great interest in problems associated with hazardous materials spills due to the anticipated increase in transportation of hazardous wastes. This project surveyed and summarized the capabilities of existing systems, and evaluated their applicability to hazardous waste spills. Federal and State regulations regarding spill notification, reporting requirements, and clean-up procedures were reviewed. Fourteen information sources, eighteen response manuals, and five response teams were evaluated in the study.

Envirex, Incorporated, Environmental Protection Agency Final Rpt. EPA/530/SW-171C, 1979, 343 p.

Contract EPA-68-01-3973

ACKNOWLEDGMENT: NTIS
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PB-297438/4ST

12 304186
RAILROAD ACCIDENT REPORT. DERAILMENT OF SOUTHERN RAILWAY COMPANY TRAIN NO. 2, THE CRESCENT, ELMA, VIRGINIA, DECEMBER 3, 1978
About 5:38 a.m., on December 3, 1978, as the Southern Railway Company's train no. 2, The Crescent, was passing through a 5 degree 15 minute curve at Elma, Nelson County, Virginia, eight cars and four locomotive units were derailed. Six persons were killed, 41 persons were injured, and property damage was estimated to be $557,500. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the engineer to observe the track ahead because he was unnecessarily distracted by a transition problem, which led to his operation of the train into a 5 degree 15 minute curve at a high speed. The high speed produced excessive lateral forces which caused the wheels of either the fourth locomotive unit or the first car to climb out of the gage, cross the head of the rail, and derail.

National Transportation Safety Board NTSB-RAR-79-4, June 1979, 28 p.

ACKNOWLEDGMENT: NTIS
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PB-297598/5ST, DOTL NTIS

12 304213
A SAFE PRACTICES MANUAL FOR THE MANUFACTURING, TRANSPORTATION, STORAGE AND USE OF EXPLOSIVES
Federal regulatory authority for control of non-military explosives is fragmented. This had led to confusion in the control of the use of such explosives. This manual describes the existing regulations, consensus standards and professional recommendations used to provide guidance in safe practices for supervisors and employees. The hazards are stated and work practices described to protect workers in manufacturing, mixing, transporting, storing, and using explosives.

Willis, JB Taylor, PD Snyder, SW Lopez, RV Errico, PH
Tracor Jitco, Incorporated, National Institute for Occupational Safety & Hlth 1978, 190 p.

Contract PHS-NIOSH-210-77-014 (5)

ACKNOWLEDGMENT: NTIS
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PB-297827/8ST

12 304441
PROGRAM TO DEVELOP ANALYTICAL TOOLS FOR ENVIRONMENTAL AND SAFETY ASSESSMENT OF NUCLEAR MATERIAL SHIPPING CONTAINER SYSTEMS
This paper describes a program for developing analytical techniques to evaluate the response of nuclear material shipping containers to severe accidents. Both lumped-mass and finite element techniques are employed to predict shipping container and shipping container-carrier response to impact. The general impact problem is computationally expensive because of its nonlinear, three-dimensional nature. This expense is minimized by using approximate models to parametrically identify critical cases before more exact analyses are performed. The computer codes developed for solving the problem are being experimentally substantiated with test data from full-scale and scale-model container drop tests. (ERA citation 04:029409)
Environmental control symposium, Washington, DC, USA, 28 Nov 1978.

Butler, TA
Los Alamos Scientific Laboratory, Department of Energy CONF-781109-10, Nov. 1978, 13 p., 6 Fig., 1 Tab.

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

LA-UR-78-3067

12 304443
FINITE ELEMENT MODEL FOR NONLINEAR SHELLS OF REVOLUTION
Nuclear material shipping containers have shells of revolution as basic structural components. Analytically modeling the response of these containers to severe accident impact conditions requires a nonlinear shell-of-revolution model that accounts for both geometric and material nonlinearities. Existing models are limited to large displacements, small rotations, and nonlinear materials. The paper presents a finite element model for a nonlinear shell of revolution that will account for large displacements, large strains, large rotations, and nonlinear materials. (ERA citation 04:045216)
International conference on structural mechanics in reactor technology, Berlin, F.R. Germany, 13 Aug 1979.

Cook, WA
Los Alamos Scientific Laboratory, Department of Energy CONF-790802-25, 1979, 11 p.

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

LA-UR-79-430

12 304469
COLLISION AVOIDANCE SYSTEMS (A BIBLIOGRAPHY WITH ABSTRACTS)
Collision avoidance systems in three modes of transportation (i.e. air, surface, marine) are investigated in these research reports. Section 1 pertains to air transportation. Traffic scheduling, automatic ground based stations, and on-board warning systems are researched. (Contains 283 abstracts) Section 2 delineates sensors and detectors relative to marine transportation collision advance. (Contains 60 abstracts) Section 3 relates to engineering research relative to highway and rail collision avoidance. (Contains 38 abstracts) (This updated bibliography contains 383 abstracts, 45 of which are new entries to the previous edition.)

Habercom, GE, Jr
National Technical Information Service Sept. 1979, 389 p.

ACKNOWLEDGMENT: NTIS
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NTIS/PS-79/0960/9ST

12 304541
RAILROAD ACCIDENT REPORT BAY AREA RAPID TRANSIT DISTRICT FIRE ON TRAIN NO. 117 AND EVACUATION OF PASSENGERS WHILE IN THE TRANSBAY TUBE, SAN FRANCISCO, CALIFORNIA, JANUARY 17, 1979

About 6:06 p.m., on January 17, 1979, the fifth and sixth cars of the seven-car westbound train No. 117 of the Bay Area Rapid Transit District (BART) caught fire while moving through the tunnel under the San Francisco Bay between Oakland and San Francisco, California. Forty passengers and two BART employees were evacuated from the burning train through emergency doors into a gallery walkway located between the two single track tunnels and then into a waiting train in the adjacent tunnel. One fireman died when the gallery suddenly filled with heavy black toxic smoke. Twenty-four firemen, seventeen passengers, three emergency personnel, and twelve BART employees were treated for smoke inhalation. Property damage was estimated to be $2,450,000. The National Transportation Safety Board determines that the probable cause of this accident was the breaking of collector shoe assemblies on Train No. 117, when it struck a line switchbox cover, which had fallen from an earlier train, resulting in a short circuit and fire. Contributing to the severity of the damage was the failure of BART to quickly and properly coordinate the Oakland and San Francisco fire departments' rescue and firefighting efforts, which did not conform with the emergency plan. The cause of the fatality and injuries was inhalation of smoke and toxic fumes emitted from burning plastic materials used in construction of the transit cars.

National Transportation Safety Board NTSB-RAR-79-5, July 1979, 63 p.

ACKNOWLEDGMENT: NTIS
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PB-298905/1ST, DOTL NTIS

12 304672
HAZARD CLASSIFICATION OF EXPLOSIVES FOR TRANSPORTATION-NONSOLID EXPLOSIVES (PHASE III)

Explosive sensitivities, major field tests, and some accidents in transportation were compiled for selected monopropellants, slurry explosives, and blasting agents. To supplement information in the literature, the projectile impact, card gap, and General Electric input-output sensitivities of certain slurry explosives and blasting agents were measured. It was concluded that the projectile impact of the card gap and the cap test results all depend on the method of conducting of the test to such an extent that the explosive classification in some cases can be changed from UN 1.1 to 1.3. A scheme for explosive hazard classification based on the new United Nations systems is discussed.

Dale, CB
Naval Ordnance Laboratory, Department of Transportation Final Rpt. DOT/RSPA/MTB-78/2, Aug. 1978, 28 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-300906/5ST

12 308306
HAZCHEM WILL TRAVEL

After reviewing several fatal accidents involving tank wagons containing chemicals, the author describes changes in design of wagons, the marking system, and safety regulations.

Leigh, C *Modern Transport* No. 8, 1979, pp 204-208, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

13 197882
MUTUAL DESIGN CONSIDERATIONS FOR OVERHEAD AC TRANSMISSION LINES AND GAS TRANSMISSION PIPELINES. VOLUME 2. PREDICTION AND MITIGATION PROCEDURES. FINAL REPORT
As a result of a program jointly funded by the Electric Power Research Institute (EPRI) and the Pipeline Research Committee (PRC) of the American Gas Association(A.G.A.), known data have been consolidated and a systematic investigation has been made into the mutual effects of ac electric power transmission lines (power lines) and natural gas transmission pipelines (pipelines) jointly sharing rights-of-way. The results presented are of use to both the electric power and natural gas transmission industries for addressing problems arising from a mutual coexistence. Program objectives were: to consolidate known data concerning mutual effects arising from power lines and pipelines sharing a common right-of-way; to develop a unified and systematic method for predicting electro-magnetically induced voltages and currents on pipelines; and to investigate mitigation techniques to minimize interference effects upon pipeline and component reliability and personnel safety. In the fulfillment of these objectives, new techniques for coupling prediction and pipeline mitigation have been developed and other available data have been collected and summarized. The overall objective of the program was to develop a reference book which concisely presented the coupling prediction and mitigation information derived in a manner useful to both power and pipeline industry users in the design, construction and operation of their respective systems. (ERA citation 04:022693)

Dabkowski, J Taflove, A
IIT Research Institute Sept. 1978, 179 p.

ACKNOWLEDGMENT: NTIS
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EPRI-EL-904(V.2)

13 300563
ELECTRIFICATION: NEW INTEREST IN AN OLD IDEA
Rising diesel fuel costs are producing some renewed interest in electrification in the U.S. Burlington Northern is again looking at its coal-hauling line across Nebraska; Tennessee Valley Authority has made proposals to Southern and Louisville & Nashville; Amtrak will be extending Northeast Corridor catenary from New Haven to Boston; and FRA is completing electrification of a test track at Pueblo.

Railway Age Vol. 180 No. 15, Aug. 1979, pp 24-26, 2 Phot.

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13 300572
PROJECT "NEW CONSTRUCTION OF THE POWER LINE STATION AT STERNSCHANZE" [Das Projekt Neubau der Netzleitstelle Sternschanze]
The power line station for the supply of dc electric power for the urban rapid transit system in Hamburg, West Germany, is discussed. Recently an electronic data processing system has been incorporated to provide control facilities. The realization of this project imposes new and interesting tasks on the persons concerned. A description is given of planning, organization and realization within the various stages of the project. [German]
See also Vol. 50 No. 2, February 1979 issue.

Gladigau, R Haupt, R *Elektrische Bahnen* Vol. 50 No. 1, Jan. 1979, pp 23-25, 2 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

13 300573
ELECTRIC OPERATION OF THE WEST GERMAN RAILROAD SYSTEM IN 1978 [Der Elektrische Zugbetrieb der Deutschen Bundesbahn im Jahre 1978]
Outstanding events in the field of electric traction in 1978 are reported. Various numerical characteristics of electric traction are stated for the year concerned. A survey of electrified lines deals with the 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 lines of structural development. The state-of-the-art and further development of traction power supply facilities are described. Test methods and participation in national and international associations of electrical engineering are dealt with. [German]

Bauermeister, K (German Federal Railway) *Elektrische Bahnen* Vol. 50 No. 1, Jan. 1979, pp 2-14, 1 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

13 300617
PROCEDURE FOR THE OPTIMAL DISTRIBUTION OF ELECTRIC POWER (PROMETHEE) FOR THE METRO AT A FIXED LEVEL [Procedure de repartition optimale, pour le metro, a un horizon fixe, de l'energie electrique (PROMETHEE)]
An interactive system is described which is part of a more comprehensive process for managing the power supply system of the metro. Using a generator of feasible "line-assignments" the problem is formulated as a bivalent (0.1) linear program. To solve it, two approaches were successively studied. The first uses both linear programming and branch and bound (PSES). The second, by relaxing some constraints, combines a decomposition method of Dantzig and Wolfe with a subgradient method. The results obtained show a substantial improvement in the objective function which has been retained as representative of the cost of mean and long range planning. [French]

Sitruk, G Heurgon, E Present, M *RAIRO Recherche Operationnelle/Operations Research* Vol. 12 No. 4, Nov. 1978, pp 351-368, 9 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

13 300635
PARAMETRIC ANALYSIS OF THE ELECTRIC UTILITY MARKET FOR ADVANCED LOAD-LEVELING BATTERIES
This task examines the market for batteries in utility load-leveling service as a function of the Battery System Coast characteristics in order to give DOE a method of assessing the results of various program alternatives. The sensitivity of the benefits (barrels of oil saved) that might be derived to the timing of the market (i.e. when it begins) is also investigated. (The real cost of fuel is to be assumed to increase 2.4% per year.) How large is the total market for a new technology; how is the relative affectiveness of Battery Storage Systems related to the cost of fuel, the capital cost of the battery, and the perception of the credits associated with battery systems; and how do these vary with time required answers in order to estimate how the market for battery systems might develop. Most of the answers were obtained by studying the data developed by MITRE/METREK for a market assessment of battery systems using lead/acid batteries. MITRE's market analysis considered a large variety of variables; since the resources and time available for the present task were limited, it was not possible to either duplicate or confirm their work in detail. The initial results of this study depend on the assumptions used by MITRE. However, where these assumptions were incomplete, the results are adjusted. The supplementary information was obtained from studies performed by Arthur D. Little, Inc. and by PSE and G.

Little (Arthur D), Incorporated Final Rpt. Feb. 1979, 35 p.

Contract EC-77-C-01-5036

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: NTIS

13 300677
EFFECTS OF ENERGY-COST VARIATION ON FEASIBILITY OF ELECTRIFYING THE CINCINNATI-ATLANTA MAIN LINE OF THE SOUTHERN RAILWAY SYSTEM
A study completed in 1975 considered the economics of electrifying the Cincinnati-Atlanta main line of the Southern Railway System. The differential cash flow of electric operation versus diesel operation, computed over the interval 1975-2002, yielded a 6.0 percent rate of return for electrification. This paper summarizes a study that applied plausible variations in energy prices to the operating scenarios used in the 1975 study. Two time intervals were chosen for analysis, taking a 2-year construction period for electrical facilities, followed by 26 years of operation. The first interval, 1975 through 2002, is identical to that of the initial study. For this interval, if the price of diesel fuel is taken as its maximum and dollar inflation is ignored, the rate of return for electrification ranges from 9.8 to 6.1 percent, depending on the price of electrical energy; if an annual dollar inflation of 10 percent is included, the corresponding rates are 20 and 15 percent. If the price of diesel

fuel is taken as its minimum and dollar inflation is ignored, the rate of return for electrification is less than 35 percent; if an annual dollar inflation of 10 percent is included, the rate of return is less than 10 percent. The second interval was 1983 through 2010. For this interval, if the price of diesel fuel is taken as its maximum and dollar inflation is ignored, the rate of return for electrification ranges from 13 to 9.2 percent, again depending on the price of electrical energy; if an annual dollar inflation of 10 percent is included, the range of rates is 23 to 19 percent. If the price of diesel fuel is taken as is its minimum and inflation is ignored the rate of return for electrification is less than 5 percent; if an annual inflation of 10 percent is included, the rate of return ranges from 7 to 10 percent.

This paper appeared in Transportation Research Record No. 694, Railroad Track and Electrification Studies.

Lawson, KL (Bechtel do Brasil Construcoes); Wujek, JH (Bechtel Corporation); Ingram, KJ (University Computing Company) *Transportation Research Record* Vol. N No. 94, 1978, pp 68-72, 5 Fig., 6 Ref.

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13 300719
PUEBLO TRANSPORTATION TEST CENTER (TTC) ELECTRIFICATION PROJECT

Electrification of the 14-mile Railroad Test Track with high-voltage ac is described. Primary purposes of the Pueblo electrification project are vehicle testing, pantography development, catenary systems development, and testing of other facilities related to electrification. Power at 50, 25 and 12.5 kV can be supplied to the catenary system where 6 different styles will be installed.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Long, ML (International Engineering Company) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 326-350

ORDER FROM: ESL

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13 301184
INFLUENCE OF TRAIN WEIGHT AND SPEED ON THE OVERHEAD SUPPLY SYSTEM IN ELECTRIC TRACTION (PART I) [Wplyw ciezaru i szybkosci pociagu na uklad zasilania trakcji elektrycznej (czesc I)]

No Abstract. [Polish]

Frontczak, F *Trakcja i Wagony* Vol. 2-26 No. 2, Feb. 1979, pp 56-63, 7 Fig., 1 Tab., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

13 301185
NEW LIGHT ALLOY COPPER CONTACT WIRES FOR PKP OVERHEAD CURRENT SUPPLY SYSTEMS [Nowe przewody jezdne z miedzi niskostopowej dla sieci trakcyjnej PKP]

No Abstract. [Polish]

Roman, Z *Trakcja i Wagony* Vol. 2-26 No. 2, Feb. 1979, pp 53-56, 5 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Trakcja i Wagony, Warsaw, Poland

13 301322
POWER SUPPLY FOR LIGHT-RAIL AND RAPID TRANSIT SYSTEMS IN GERMANY

The purpose of this paper is to define the present state of the art in the design of the power supply for light-rail and rapid transit systems in Germany. The scope includes the incoming alternating-current switchgear, rectifier direct-current switchgear, catenary, and third-rail systems, as well as the breaker on the light-rail vehicle. Attention is paid to the problems of coordinating the various components of standard design and of dealing with corrosion due to the leakage of current from the power supply. Experiences with various catenary designs and their interconnections in Germany are also described. This paper is limited to experience in Germany, and the underlying design criteria are based on German electrical regulations. Since the implementation and reliability of power supply for light-rail and rapid transit systems in Germany are considered to be highly successful, the data, views, and experience presented in this paper should be of interest in North America. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Wolff, G (Siemens A.G.); Waite, WB (Siemens Electric Limited) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 142-149, 18 Fig., 1 Ref.

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13 301420
SINGLE PHASE 25 KV-50HZ CURRENT ELECTRIFICATION: REMARKS ON CALCULATIONS USED IN THE DESIGN OF THE ELECTRIC SYSTEM [Elettrificazione monofase 25 kV-50Hz: Osservazioni sul calcolo del sistema elettrico]

An examination of the main problems met when designing railway electrification systems using single phase 25 kV-50 Hz current, in particular those which do not arise when d.c. current is used. [Italian]

Capasso, A La Rosa, S *Ingegneria Ferroviaria* Vol. 34 No. 5, May 1979, pp 331-342, 15 Phot., 6 Ref., 2 App.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

13 301424
DEVELOPMENT OF 50 HZ SINGLE-PHASE ELECTRIFICATION THROUGHOUT THE WORLD AND THE ROLE OF THE 50 HZ GROUP [L'expansion du monophase 50 Hz dans le monde et le role du Groupement 50 Hz]

After recalling the history of the first 25 kV 50 Hz tests in France nearly 30 years ago, the author refers to the working of the 50 Hz Group, which includes the major French, German, Swiss and Belgian electrical construction companies. During the last 25 years, this Group has received many orders from all over the world, and has granted licences in several cases. [French]

Chenais, J-P *Revue Generale des Chemins de Fer* Vol. 98 May 1979, pp 221-226, 1 Tab., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

13 301431
TRANSMISSION OF CURRENT THROUGH A COMPOSITE ALUMINIUM THIRD RAIL ON THE HAMBURG S-BAHN [Elektrische Energieuebertragung mit Aluminum-Verbundstromschienen bei der Hamburger S-Bahn]

No Abstract. [German]

Haupt, R Freidhofer, H *Elektrische Bahnen* Vol. 50 No. 4, 1979, pp 96-101, 5 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

13 301447
OSCILLATORY RANGE OF FEEDER LINE AND PROTECTIVE WIRE UNDER STRONG WIND

Short circuits between feeder and protective wires in the overhead current distribution for AC electrified lines of JNR occur at times because of wind forces. The oscillation of these wires has been observed and simulated so that supports and spacing could be established.

Hamakawa, C *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, p 85, 2 Fig., 1 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

13 301448
MEASUREMENT OF ROTATIONAL RESISTANCE OF FREE BRACKETS ON THE OVERHEAD WIRE SYSTEM

A tensioned catenary supported on free brackets requires that the brackets displace with minimal frictional resistance. The value of this resistance and variation of tension through an entire section of compound catenary were measured.

Hamakawa, C *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, p 86, 3 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

13 301718
D.C. TRACTION IN SOUTH AFRICA [La traction a courant continu en Afrique du Sud]
The South African Rail network has used very different current systems since electrification first began in 1903: 1.5 and 3 kV d.c. current and now 3 kV only; 25 and 50 kV 50 Hz a.c. current. Study of electrification from the start until today using d.c. current and present tractive stock. [French]
See also No. 1696, June 3, 1979 issue pages 49-51.

Darnault-Donath, Y *Vie du Rail* No. 1695, May 1979, pp 8-14, Figs., Tabs., Phots.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Editions NM, 75440 Paris, France

13 301719
ELECTRIFICATION WORK ON THE BORDEAUX--MONTAUBAN LINE AND THE RIGHT BANK OF THE RHONE; COMPARISON OF THE MEANS USED [Les travaux d'electrification de Bordeaux-Montauban et de la rive droite du Rhone: comparaison des moyens mis en oeuvre]
In 1977 electrification work began on two major SNCF worksites to install 1500 d.c. current. Because of the time needed for the work, the means used are very different and are described in turn by the author. [French]

Luppi, J *Revue Generale des Chemins de Fer* Vol. 98 June 1979, pp 296-304, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

13 301728
DEVELOPMENT OF THE PANTOGRAPH SLIPPER ON DB TRACTIVE UNITS [Entwicklung der Schleifleiste fuer Stromabnehmer der Triebfahrzeuge der Deutschen Bundesbahn]
No Abstract. [German]

Zoeller, H *Elektrische Bahnen* Vol. 77 No. 5, May 1979, pp 133-139, 11 Phot., 4 Ref.

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

DOTL JC

13 302135
ALUMINIUM-ALLOY CONDUCTORS FOR A.C. TRACTION OVERHEAD EQUIPMENT
The paper gives a brief account of the investigation and development work done by the Indian Railways in close collaboration with Indian manufacturers of aluminium conductors and fittings in evolving suitable substitutes of cadmium-copper catenary wire, grooved copper contact wire, copper dropper wires and fittings, as used in the conventional simple polygonal type of 25 kV a.c. traction overhead equipment. Two short lengths of the first aluminium-alloy traction overhead equipment have been under service trial on one of the busy main lines between Calcutta and New Delhi for the past six or seven years. Large-scale trial installations on all the zonal Railways equipped with 25 KV a.c. traction are in hand.

Mukerjee, MN Sandaranarayanan, CA *Institution of Electrical Engineers, Proceedings* Vol. 126 No. 7, July 1979, pp 665-669

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

13 302336
RESULTS OF STUDIES CONDUCTED AT THE SZD ON DEFINITION OF OPTIMUM CONDITIONS FOR CURRENT COLLECTION AT INCREASED SPEEDS [Untersuchungsergebnisse der SZD bei der Ermittlung der optimalen Bedingungen der Stromabnahme bei Erhoehung der Fahrgeschwindigkeit]
No Abstract. [German]

Beljaev, I Vologin, V *Zeitschrift der OSShD* Vol. 22 No. 2(124), 1979, pp 14-18, 5 Fig., 1 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

13 302337
USE OF PLASTICS IN CATENARY CONSTRUCTION ON THE PKP [Anwendung von Plaste im Fahrleitungsnetz der PKP]
No Abstract. [German]

Wroblewska, M Kaminski, A *Zeitschrift der OSShD* Vol. 22 No. 3(125), 1979, pp 8-13, 5 Fig., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Railway Cooperation Organization, Komitee fuer Eisenbahnverkehr, Hoza 63/67, Warsaw, Poland

13 302724
THE STANDARD CATENARY ON THE GERMAN FEDERAL RAILWAY [Die Regelfahrleitung der DB]
The catenaries used by the DB were built after 1950, based on standard basic principles. The basic design allowed for use at speeds of up to 250 km/h. The article gives details of catenary behaviour and building and maintenance costs. It points out the advantage of having standard parts and components. [German]
See also vol. 77 No. 7, July 1979 issue, pages 207-208.

Elektrische Bahnen Vol. 77 No. 6, June 1979, pp 175-180, 1 Tab., 6 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

13 303196
MAINTENANCE POLICY FOR ELECTRICAL AND SIGNALING INSTALLATIONS
The paper examines the organization of the maintenance work in detail and deals specifically with the maintenance of overhead line equipment.

Weber, O (French National Railways) *French Railway Techniques* No. 1, 1979, pp 40-48

ACKNOWLEDGMENT: EI
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DOTL JC

13 303200
RECENT PROBLEMS CONNECTED WITH SINGLE-PHASE TRACTION CURRENT SUPPLY [Derniers problemes concernant l'alimentation de la traction monophasee]
The problems associated with the extension of the single-phase traction current system and the introduction of new motive power stock are discussed and various measures taken to provide a satisfactory solution to lessen the effects of a circuit-breaker tripping on the quality of service, and to identify quickly damaged overhead equipment in the case of a mishap are described. [French]

Laurenceau, J-N *Revue Generale des Chemins de Fer* Vol. 97 Dec. 1978, n.p.

ACKNOWLEDGMENT: EI
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13 303579
MAIN-LINE ELECTRIFICATION REVIEW: 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.

Modern Railways Vol. 36 No. 374, Nov. 1979, pp 478-483, 10 Tab., 5 Phot.

ORDER FROM: Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, England

13 303643
USE OF AN OPTIMIZATION PROGRAM TO PLAN THE MODERNIZATION OF THE TRACTION CURRENT DISTRIBUTION NETWORK [Einsatz eines Optimierungsprogramms bei der Ausbauplanung fuer das Bahnstromleitungsnetz]
The purpose of evaluation of flux charge is to determine voltages, currents and power fluxes in electrical transmission networks, so as to be aware of the capacity for different types of operation of a network. Such an evaluation is also important for making modernization plans and determining the maximum load. By using an optimization method and digital computer program the best solutions to a given problem may be found. [German]

Hartkopf, T *Elektrische Bahnen* Vol. 77 No. 8, 1979, pp 238-244, 1 Tab., 11 Ref.

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

DOTL JC

13 307644
INFLUENCE OF NEW ELECTRONIC TECHNIQUES ON THE CHOICE OF SYSTEM OF ELECTRIC RAILROAD TRACTION [Influenza delle nuove tecniche elettroniche sulla scelta del sistema di trazione elettrica ferroviaria]
The electric railway traction has been traditionally presented according to "system" clearly diversified into components, primary feeding, sub-stations, contact lines, on-board control and locomotive engines. Each system has had therefore its own overall characteristic of advantages and inconveniences, thoroughly rigid even if differently variable with the time as a function of progress in engineering. Power electronics has overcome this "system rigidity": any system can now start from the same primary network, use quite similar contact lines, on-board controls and engines; that is why the only thing which remains to be done is, case by case and following indicated criteria, to choose the system of transmission, from sub-stations to locomotives, preferably as a function of characteristics of the available primary network, of the network to electrify, and of the type of traffic to operate. [Italian]

Mayer, L *Elettrotecnica* Vol. 66 No. 4, Apr. 1979, pp 267-280

ACKNOWLEDGMENT: EI
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13 307677
THE EXTRA-RAPID D.C. CIRCUIT-BREAKER [Le disjoncteur ultra-rapide a courant continu]
An extension and development has been observed for several years in both railway lines and rolling stock operating with direct current. The circuit-breaker has had to be adapted to an ever higher standard of requirements, particularly with regard to its circuit-breaking power in sub-stations and reliability on board vehicles. The author analyses the criteria for the choice of a circuit-breaker, and describes Secheron switches with their characteristics and particular features. [French]

Bugnon, B *Brown Boveri Review* Vol. 66 No. 7, 1979, pp 482-487, 11 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland

13 307678
OPTIMISATION OF PLANS FOR D.C. TRACTION SUB-STATIONS [Optimisation des projets de sous-stations de traction a courant continu]
One of the main problems in electrified transport projects is that of the judicious choice of sites for sub-stations on the network, and a proper choice of their characteristics. Since many parameters are involved, the use of traditional calculating methods is prohibitive. However, the computer now makes it possible to carry out the necessary calculations rapidly and accurately. The author describes a procedure which enables a design engineer to modify the sites, number and ratings of sub-stations equipped with rectifiers or inverters. [French]

Vorms, G *Brown Boveri Review* Vol. 66 No. 7, 1979, pp 488-494, 14 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland

13 308284
A STUDY OF ASYMMETRICAL LOADING WHEN RAILWAY LINES ARE SUPPLIED WITH 50 HZ AND 60 HZ CURRENT FROM THE PUBLIC UTILITY NETWORK [Untersuchung ueber die Belastungsunsymmetrie bei der Speisung von 50 Hz-und 60 Hz-Eisenbahnstrecken aus dem Landesnetz]
Three-phase networks are loaded asymmetrically when railways are supplied with electric current. The effect of this asymmetry depends mainly on the wiring selected. A comparison of wiring diagrams with the Scott transformer, V-connection, and cyclic three-phase distribution shows that average single-phase efficiency can only reach between 54%, 13% and even as little as 5% of the mean one-hour rating of the total output. [German]

Schaefer, H-H *Elektrische Bahnen* Vol. 77 No. 9, 1979, pp 262-267, 5 Tab., 8 Phot., 4 Ref.

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

DOTL JC

13 308288
ELECTRIC FACILITIES OF SHINKANSEN
The electrical installations of the Shinkansen were developed in three stages. The first stage corresponded to the first Shinkansen line between Tokyo and Osaka, the second to the Sanyo link between Osaka and Okayama, and afterwards to Hakata. The third stage is the Tohoku line at present under construction. At each stage, the JNR have taken advantage of the very latest techniques and experience acquired beforehand, in a constant effort to improve and perfect the service. The article reviews the power equipment for operating, the operational safety apparatus, the information transmission equipment and the electric maintenance equipment for the track and rolling stock.

Seko, I *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 7-10, 2 Fig., 2 Tab., 1 Phot.

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

DOTL JC

13 308444
HIGH-VOLTAGE POWER CONSUMERS (NATIONALIZED UNDERTAKINGS) [Clientele haute tension (Service national)]
Roughly five-hundred load curves for h.v. power consumers, managed by the French Production and Transport Authority, on the third Wednesday of December 1974 are classified according to their shape, regardless of the size of the undertakings concerned. The classification is based on a "dynamic cluster" algorithm. The four following distinctive types of consumer-load curve emerge: flat curves: 48% by number, 67% by consumption; modulated curves: 34% by number, 16.5% by consumption; minimum peak consumption curves: 15% by number, 15.5% by consumption; off-peak consumption curves: 3% by number, 0.5% by consumption. Classification results are given for each inter-regional power transfer center followed by a synthesis for the country as a whole. An attempt is made to interpret the four categories in terms of "explanatory" variables (activities, tariff rates, power subscribed and duration of annual peak power consumption) by factorial correspondence analysis. "Withdrawal" of minimum peak-power and off-peak power consumers is evaluated (for each inter-regional power transfer center and for independent consumers) with a view to estimating the effectiveness of existing French tariff rates for h.v. consumers. [French]

Complete title of Bulletin is Electricite de France. Direction des Etudes et Recherches. Bulletin. Serie B: Reseaux Electriques, Materiels Electriques.

Pioger, M *Electricite de France. Serie B* No. 3, 1978, pp 38-56, 9 Ref.

ACKNOWLEDGMENT: EI
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15 197653
FEASIBILITY ANALYSIS OF JOINT DEVELOPMENT FOR TRANSIT STATIONS IN THE DETROIT AREA

The concept of Joint Development(JD) embodies various forms of public/-private sector coordination relative to physical, fiscal, and institutional aspects of transit station development. The objective of this study is to analyze the feasibility of joint development in conjunction with transit station area planning in the Detroit area where the planning of a high-level transit system is underway. The report is organized in three parts. In the first part, the basic concepts of JD are initially presented with a brief state-of-the-art review and a discussion of opportunities, incentives, and constraints. In the second part, the feasibility of joint development in the Detroit area is examined relative to the legal, institutional, and fiscal framework. The development and application of an analytic technique for prioritizing station locations based upon development potential is also presented in Part two. The last part of the report provides the conclusions and recommendations, along with a series of guidelines that may be applied for planning joint development studies in transit stations in other urban areas.

Khasnabis, S Opiela, KS Arbogast, RG
Wayne State University, Urban Mass Transportation Administration, (UMTA-MI-11-0003) Final Rpt. UMTA-MI-0003-79-1, Nov. 1978, 266 p.

ACKNOWLEDGMENT: NTIS
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PB-295347/9ST

15 198468
SIMULATION OF THE SYSTEM ENERGY, ENVIRONMENT, INDUSTRY: ENERGY CONSUMPTION OF TRANSPORTATION IN BADEN-WUERTTEMBERG. PART 1. FUNDAMENTALS OF THE MODEL

Correlations between industrial production, socio-economic conditions and transportation, on the one hand, and transportation and energy consumption, on the other hand, are presented in a number of tables and figures. Conclusions are drawn from statistical data on functional relationships. Empirically based trend extrapolations are formulated. (ERA

U.S. Sales Only.

Le Van, T
Stuttgart University, West Germany Aug. 1977, 72 p.

ACKNOWLEDGMENT: NTIS
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IKE-K-51-3

15 199100
PROPOSED RAILROAD RELOCATION, CONSOLIDATION, AND GRADE-CROSSING ELIMINATION PROJECT FOR COLUMBIA, SOUTH CAROLINA

The report describes a two-phase plan to relocate and consolidate portions of the Southern and Seaboard Coast Line railroads through the city of Columbia, South Carolina. It is a development of the most feasible of several alternative plans that were considered in earlier studies. Detailed preliminary engineering plans, cost estimates and socio-economic impacts are presented for Phase I which represents approximately 80% of the estimated $70-million project. Phase II is described in concept and recommended for later development and implementation. The plan features a north-south 3-track depressed consolidation corridor that would be used by both railroads in traveling through the central city. This, together with the relocation, elimination or reclassification of considerable existing track, plus the construction of grade separation structures and some secondary street barricades, will significantly benefit rail, vehicular and pedestrian traffic through improved speed, safety, economy and convenience. Improvement in land values, particularly along the Congaree River in the central city, and the facilitation of community development are anticipated. Negative impacts on business or residential neighborhoods are minimized by routing track through existing rail corridors or over mostly undeveloped land. At present, an environmental/community impact assessment is in progress; results are expected in 1980.

Prepared in cooperation with Whitehead (Ralph) and Associates, Charlotte, NC.

Central Midlands Regional Planning Council, Whitehead (Ralph) and Associates, Federal Railroad Administration Final Rpt. FRA/OPPD-79/13, July 1979, 259 p.

Contract DOT-FR-75224
ACKNOWLEDGMENT: NTIS
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PB-299157/8ST

15 302271
THE IMPLICATIONS OF TRANSIT INVESTMENT ON URBAN DEVELOPMENT, SOUTHEASTERN MICHIGAN

This study of the implications of transit-induced development patterns was intended to synthesize available information on the proposed transit alternatives for Southeastern Michigan. An investment in additional transit capacity in Southeastern Michigan would accomplish a number of regional objectives. It would stimulate the economic vitality of the region, improve accessibility, reduce traffic congestion, maintain air quality, provide for the flexibility to conserve energy, and slow urban sprawl. The Southeastern Michigan Transportation Authority has proposed six transit alternatives which are designed to fill transportation needs as well as this more comprehensive set of objectives for the future of this important urbanized metropolitan area. Each of the alternatives include improvements to the existing public transit system: small bus; express bus; feeder bus; commuter rail; and the addition of a downtown people mover for circulation in Detroit's central business district. Four of the alternatives also include a light rail system which differs in length and in the extent to which its alignment is subsurface. A major issue in public discussion has been the magnitude of the development which would be stimulated within the region's urban core as a result of an investment in transit. Two purposes govern the analysis: 1) to interpret the findings of previous impact analyses in terms of the urban economic, environmental, and transportation policies and 2) to define the magnitude of the shift from suburban jurisdictions and to discuss the implications of these shifts in relation to the relative share of the cost borne by suburban communities or counties. This report discusses and analyzes the need for transit improvements, the policy context of these improvements, land use and urban development impacts, public service implications, financial and fiscal impacts, and equity considerations.

Prepared for the Southeastern Michigan Transportation Authority and the Michigan Department of State Highways and Transportation. This document contributes to the final summary chapter of the Public Transportation Alternatives Analysis-Draft Environmental Impact Statement, Southeastern Michigan.

Grefe, R
Grefe (Richard) Associates, Urban Mass Transportation Administration, (RGA/79-001) Final Rpt. UMTA-MI-09-0030-79-1, Feb. 1979, 133 p.

Contract MI-09-0030

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15 302274
AN ANALYSIS OF JOINT DEVELOPMENT PROJECTS: FINAL REPORT ON FIRST YEAR TASKS

This report presents the results of the first year of study into a number of characteristics of an urban area in which joint development is taking place. The objectives of this study are to: 1) investigate the economic and population trends that influence economic and location decisions within the region; 2) investigate ways in which transit serves as a catalyst for development and in particular, delineate and quantify these ways; 3) determine the relative attractiveness of downtown as a retail attractor when compared with suburban regions; and 4) investigate analytic techniques that may help delineate the success of particular joint development projects. The study was carried out in the Buffalo, New York SMSA. Construction has recently begun on a six-mile Light Rail Rapid Transit System (LRRT). This study focuses on Central Business District and Regional development concerns with specific attention to the LRRT. The results of a number of tasks accomplished during the first year of analysis are discussed and brief summaries of discussions with local planners or policy makers are presented. The findings of the study found to be most significant are: 1) the phenomenon of suburbanization is so strong that competing redevelopment strategies, even those of major proportions may not succeed, except under the most focused and intense development conditions; 2) the importance of the combination of population decline and job category shifts must be realized; 3) accessibility is not the only, nor even the most important variable that should be measured by transit improvements; 4) variables that control retail activity linked to transit include quality of the activity, parking, and safety, and that currently, the CBD in Buffalo is not "attractive" enough to

offer competitive pull to the suburban malls; and 5) the new LRRT is perceived of, together with a proposed joint development mall, as a positive gain for the CBD.

Paaswell, RE Berechman, J Parker-Simon, K McNally, M Cirrincione, M
State University of New York, Buffalo, Urban Mass Transportation Administration Final Rpt. UMTA-NY-11-0020-79-1, May 1979, 140 p.

Contract NY-11-0020

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15 302343
THE NATURE AND EXTENT OF COMMUNITY IMPACTS RESULTING FROM INCREASED COAL TRAFFIC IN MINNESOTA AND NORTH DAKOTA

This paper summarizes findings of the Phase I effort of this project which identified problems and the communities throughout the corridor are experiencing with growing unit-train traffic and determined those communities in which the problems are occurring, including those experiencing the most severe impact. Generally the most severe problems are emergency vehicle delay and vehicle safety. Changes in community activity patterns and railroad operating practices are seen as low-cost solutions. Even if practical, most communities would not favor diversions away from them since they perceive that the existence of railroad service is a major benefit to community development.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Taggart, RE Walker, NS Cameron, WJ (Ernst & Whinney)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 75-85

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

15 302414
ESTIMATING SOCIOECONOMIC IMPACTS OF TRANSPORTATION SYSTEMS

This study develops a methodology to estimate the socioeconomic impacts of multimodal transportation plans and programs in Maryland. The impacts include government expenditures of plan implementation, socioeconomic impacts of expenditures (i.e., personal income, employment, and population), displacement of businesses and households, and land use, accessibility, safety, and socioeconomic impacts of new transportation services and facilities (i.e., personal income, employment, and population). The programs evaluated include the Port of Baltimore; Baltimore-Washington International Airport; general aviation airports; rail (commuter and intercity) facilities; mass transit (bus and rail rapid transit); Interstate, primary, and secondary highway systems; low-capital improvements; and operating programs. The methodology consists of 26 impact-estimating equations, each of which was developed for statewide, regional, and county levels of detail. As a test application, the equations were used to evaluate the impacts of a 20-year $10-billion Maryland transportation plan. Socioeconomic impacts related to expenditures and new facilities or services were shown to generate $18 billion in personal income over this period with an average annual employment impact of 48000 jobs and an average annual population impact of 100000 people. The Baltimore region experienced the largest impact (83 percent of total statewide impacts). The Baltimore city and Baltimore county areas experienced 60 percent of the Baltimore region's impact. (Author)

This paper appeared in Transportation Research Record 716, Local and Regional Development and Transportation Needs.

Taggart, RE Walker, NS (Ernst and Ernst); Stein, MM (Maryland Department of Transportation) *Transportation Research Record* No. 716, 1979, pp 9-20, 4 Fig.

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15 302716
IMPACTS OF URBAN RAILWAYS

Developmental and environmental impacts of railroad construction and operation in Canadian urban centres increasingly are expected to present difficult issues for planners, decision-makers and administrators. Three categories of railroad/urban development concern exists: allocation of outmoded or poorly-located rail facilities, encroachment of urban development on existing railways, and in the largest metropolitan areas, development of new light rail rapid transit. Addressing these concerns means confronting: (a) poorly developed concepts and methods for the assessment of developmental and environmental impacts; (b) inadequate integration of rail transport with land use planning and decision-making at municipal, regional and provincial levels; and (c) inadequate community consultation during such planning and decision-making, contributing to community opposition to specific project proposals. Phase 1 of the research examined the extent to which developmental and environmental impacts present/will present problems for urban areas in Canada; how these problems are being perceived and tackled in key centres, the state-of-the-art of assessing railway impacts, and community concerns with respect to urban railroads.

Armour, A Lang, R
Toronto-York University Joint Program in Transp Res Rpt. No. 59, No Date, 276 p.

ORDER FROM: Toronto-York University Joint Program in Transp, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario M3J 1P3, Canada

15 303965
LIFE WITHOUT THE RAILROAD: ECONOMIC EFFECT OF RAIL ABANDONMENT ON THE COMMUNITY

This paper reviews an assessment, made by the Staff Studies Group of the Association of American Railroads (AAR), of the economic impact on those communities that may lose rail service because deregulation might make easier the abandonment of light-density lines that serve them. Rather than depend on projections that may be biased by assumptions, the method used was to examine the impacts on communities in which rail service had already been abandoned. Several case studies were examined of various communities between 1920 and 1975. It was concluded that there is little adverse community impact attributable to the loss of rail service. The studies have found many instances in which the postabandonment community impacts were positive. Findings show that branch lines are seldom an important part of community economic activity and that other economic factors are more responsible than rail branch-line service for shaping the future of a local economy. Many branch-line abandonments simply marked the end of a series of unfavorable local economic events. The shock of abandonment often forced local communities into the realization that long-standing adverse economic trends had to be reversed if they were to prosper. Shippers often found that switching to other transportation required a reorganization of their distribution patterns--a change that resulted in reduction in their total operating costs. Local trucking also provided added local employment and purchases of fuel, meals, and supplies that did more to stimulate the local economy than had the former rail branch-line operation.

This article appeared in Transportation Research News No. 85.

Sammon, JP *Transportation Research News* No. 85, 1979, pp 5-6, 1 Phot., 7 Ref.

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15 304269
LEGAL, INSTITUTIONAL, AND POLITICAL ISSUES IN TRANSPORTATION OF NUCLEAR MATERIALS AT THE BACK END OF THE LWR NUCLEAR FUEL CYCLE

A study was conducted to identify major legal and institutional problems and issues in the transportation of spent fuel and associated processing wastes at the back end of the LWR nuclear fuel cycle. (Most of the discussion centers on the transportation of spent fuel, since this activity will involve virtually all of the legal and institutional problems likely to be encountered in moving waste materials, as well.) Actions or approaches that might be pursued to resolve the problems identified in the analysis are suggested. Two scenarios for the industrial-scale transportation of spent fuel and radioactive wastes, taken together, highlight most of the major problems and issues of a legal and institutional nature that are likely to arise: (1) utilizing the Allied General Nuclear Services (AGNS) facility at Barnwell, SC, as a temporary storage facility for spent fuel; and (2) utilizing AGNS for full-scale commercial reprocessing of spent LWR fuel.

Lippek, HE Schuller, CR
Battelle Human Affairs Research Centers, Department of Energy Mar. 1979, 188 p.

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16 197124
ENERGY INTENSITY OF VARIOUS TRANSPORTATION MODES
This paper is an overview of the existing literature related to the energy intensity of various transportation modes, including intracity (automobiles, buses, automated guideway transit systems, vans, and heavy and light rail transit) and intercity (airplanes, automobiles, buses, trucks, rail, waterways, and pipelines) modes for passenger and freight movement. Energy intensity has been correlated with operating conditions such as speed, load factor, and type of commodities being moved. Statistical and engineering approaches have been used to estimate energy intensity. Energy intensity values vary considerably according to operating conditions, types of hardware, trip characteristics, load factors, and types of commodities being shipped. Suggested energy intensity values for several transportation modes are discussed. /Author/

This paper appeared in TRB Research Record No. 689, Energy Efficiency of Various Transportation Modes.

Mittal, RK (Aerospace Corporation) *Transportation Research Record* No. 689, 1978, pp 25-31, 11 Fig., 3 Tab., 8 Ref.

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16 197126
ENERGY CONSUMPTION OF THE JOURNEY TO WORK WITH AND WITHOUT A SUBURBAN RAPID TRANSIT LINE
In an effort to provide an improved framework for evaluating alternative transportation systems with respect to energy conservation, the Philadelphia-Lindenwold rail rapid transit line was studied. The energy consumed by journey-to-work trips on the Lindenwold Line in 1970--including not only the energy required to operate the line but also the energy required for access and egress--was estimated (along with the cost of the fuel consumed by these trips). The energy that would have been consumed by these trips if the former modes of travel were used was also estimated. Comparison of these two amounts of energy consumption provides a basis for evaluating the energy conservation potential of the Lindewold Line. It is found that (a) the slightly indirect nature of the park-and-ride mode results in longer travel distances than did the automobile and bus modes it replaced and (b) the lower energy intensiveness of park-and-ride relative to the automobile does not offset these longer travel distances because many users of the line are former bus riders. Thus, the park-and-ride system consumes slightly more energy than did the former travel modes. It is concluded that the added travel distance of park-and-ride systems and the extent to which users of such systems are attracted from buses rather than from automobiles should be considered in evaluating rapid transit park-and-ride systems with respect to energy conservation. /Author/

This paper appeared in TRB Research Record No. 689, Energy Efficiency of Various Transportation Modes.

Boyce, DE Ferris, ME (Illinois University, Urbana); Nguyen, K (World Bank) *Transportation Research Record* No. 689, 1978, pp 38-44, 3 Fig., 4 Tab., 9 Ref.

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16 197872
HISTORIC AND FORECASTED ENERGY PRICES BY U.S. DEPARTMENT OF ENERGY REGION AND FUEL TYPE FOR THREE MACROECONOMIC SCENARIOS AND ONE IMPORTED OIL PRICE ESCALATION SCENARIO
The Offices of the Assistant Secretary for Conservation and Solar Applications, and the Assistant Secretary for Policy and Evaluation, requested the Energy Information Administration to provide forecasts of energy prices at the DOE regional level for each year through the year 2000. Historical fuel prices for 1975, and 1976, and forecasted fuel prices for 1985 and 1990 are reported as an initial step in this process. The assumptions and the methodology employed are described and results are tabulated. Specific data for each of the ten DOE regions and the national average for the four economic sectors (residential, commercial, industrial, and transportation) are shown in tables. Summary information for each economic sector is also shown in tables.

Borg, S Moden, R
Energy Information Administration Dec. 1978, 38 p.

ACKNOWLEDGMENT: NTIS
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16 197889
INVESTIGATION OF THE SHORT-AND LONG-TERM FLEXIBILITY OF ENERGY DEMAND RELATED TO ENERGY PRICES IN THE GERMAN FEDERAL REPUBLIC
An introductory survey is given on the development of energy consumption and price behavior in the FRG from about 1960 onward, whereby the difficulties are especially indicated for estimates and correlations resulting from the 1973/74 break in structures. Four models each were estimated for five energy carriers: coal, heating fuel oil, fuels, gas, and electricity, and fuel consumer groups: total industry, steel industry, industry without steel, household and small consumers, and transportation. Four models were employed: one using relative prices, one using deflated prices, one without and one including the crisis year 1974. The determined price flexibilities alone were not conclusive. The energy political decision for one of the price variants permitted useful statements on the price flexibilities in the chosen categories. (ERA citation 04:023492)

U.S. Sales Only.

Lehbert, B
Kiel University, West Germany Sept. 1977, 107 p.

ACKNOWLEDGMENT: NTIS
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NP-23566

16 197920
ENERGY CONSERVATION: TRANSPORTATION. VOLUME 1. 1964-1977 (A BIBLIOGRAPHY WITH ABSTRACTS)
The potential to achieve fuel conservation through technology, management, and planning is discussed. Transportation areas covered include urban mass transit, aviation, marine transportation, automobiles, trucks, and railroads. A few abstracts discuss public attitudes concerning conservation measures. (This updated bibliography contains 250 abstracts, none of which are new entries to the previous edition.)

Hundemann, AS
National Technical Information Service Bibliog. June 1979, 257 p.

ACKNOWLEDGMENT: NTIS
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16 197922
ENERGY CONSERVATION UPDATE, 1979
The subject matter covered includes energy conservation technology in buildings, transportation and propulsion, and industry, energy policy, waste processing plants and equipment, energy storage, energy conversion, advanced automotive systems, combustion systems, power cycles, synthetic fuels, and power transmission.

There are 12 issues. Paper copy available on subscription, North American Continent price $27.50/year; all others write for quote. Single copies also available in paper or microfiche.

Department of Energy 1979, n.p.

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16 198475
ENERGY CONSERVATION: TRANSPORTATION. VOLUME 2. 1978-MAY, 1979 (A BIBLIOGRAPHY WITH ABSTRACTS)
The potential to achieve fuel conservation through technology, management, and planning is discussed. Transportation areas covered include urban mass transit, aviation, marine transportation, automobiles, trucks, and railroads. A few abstracts discuss public attitudes concerning conservation measures. (This updated bibliography contains 69 abstracts, 52 of which are new entries to the previous edition.)

Hundemann, AS
National Technical Information Service Bibliog. June 1979, 75 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTIS/PS-79/0558/1ST

16 198540
WORLDWIDE TRANSPORTATION/ENERGY DEMAND FORECAST: 1975--2000
Worldwide transportation energy demand for both commodities and passengers are forecast for 1975--2000. Much data are compiled in 68 figures and 20 tables. The long-range forecast methodology is first described. Then regional aggregation and economic/demographic projects are covered. Information on transportation projections and transportation energy projections complete the chapters. A transportation energy data base is discussed in Appendix A with a complete list of transportation variables that are incorporated in the data base tabulated. Energy coefficients are included in Appendix B. (ERA citation 04:026747)

Ayres, RU
Delta Research Corporation, Department of Energy Oct. 1978, 105 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ORNL/Sub-78/13536/1

16 198900
TRANSPORTATION ENERGY CONSERVATION DATA BOOK: EDITION 3
This is the third edition of the Transportation Energy Conservation Data Book, a statistical compendium compiled and published by Oak Ridge National Laboratory (ORNL) under contract with the Transportation Energy Conservation (TEC) Division of the Department of Energy (DOE). Secondary data on transportation characteristics by mode, on transportation energy use, and on other related variables are presented in tabular and/or graphic form. All major modes of transportation are represented: highway, air, rail, marine, and pipeline. The six main chapters focus on various characteristics of the transportation sector including (1) modal characteristics, (2) current energy use, efficiency and conservation, (3) projections of modal energy use, (4) impact of government activities, (5) supply and cost of energy, and (6) general demographic and economic characteristics. Included in the more than 400 tables and figures are the following transportation stock and use statistics: number of vehicles, vehicle-miles traveled, passenger-miles and freight ton-miles, fleet characteristics, household automobile ownership, size mix of automobiles, vehicle travel characteristics, and commuting patterns. Energy characteristics presented include energy use by fuel source and transportation mode, energy intensity figures by mode, indirect energy use, production as a percent of consumption, imports as a percent of domestic production, energy prices from the wellhead to the retail outlet, and alternative fuels. (ERA citation 04:036892)

Shonka, DB
Oak Ridge National Laboratory, Department of Energy ORNL-5198(Ed.3), Feb. 1979, 513 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ORNL-5493

16 198901
ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
A study was undertaken aimed at determining the causes of the divergences among published energy-intensity values and at preparing a set of consistent values. This volume presents the findings in relation to the passenger-transportation modes. After a brief overview of the important factors to be considered and the potential pitfalls facing users and analysts of energy-intensity values, a chapter is devoted to each of the major means of passenger transportation: air, automobile, bus, and rail. In each of these chapters, after a critique of the available data sources, a consistent time series of operational data and energy-intensity values is presented for the major sectors of each mode. Engineering simulations and data analysis are also carried out, quantifying the principal determinants of modal energy use to facilitate modification of current energy-intensity values to reflect changing operational and hardware-related parameters. Finally, matrices giving the great-circle distances and modal-circuity ratios among the 50 largest standard metropolitan statistical areas are included to facilitate intermodal comparisons. (ERA citation 04:030519)

Rose, AB
Oak Ridge National Laboratory, Department of Energy Jan. 1979, 177 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ORNL-5506

16 199096
PATH ENERGY CONSERVATION STUDY
The national policy on conservation of energy and related resources brought about by the energy crisis of 1973 prompted the Port Authority Trans-Hudson Corporation (PATH) to develop an energy conservation program. In the accomplishment of the technical study, PATH was to review and evaluate current energy conservation practices instituted on the PATH system and to perform extensive operational planning and comparative analysis required for the implementation of additional potential energy savings measures. This report discusses in detail the five tasks which were used in carrying out the work required in the project: (1) investigation of current practices; (2) potential service modifications; (3) rail car power investigation; (4) potential long-range improvements; and (5) preparation of a final report describing the work accomplished during the project.

Port Authority of New York and New Jersey, Urban Mass Transportation Administration, (UMTA-IT-09-0069) Final Rpt. UMTA-IT-09-0069-79-2, Nov. 1978, 169 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299143/8ST

16 300562
DIESEL FUEL: THE SQUEEZE IS ON
Conservation efforts of the railroad industry and design activity of locomotive builders are serving to increase steadily the gross ton miles produced by a gallon of diesel fuel on American railroads. Details of builders' changes in motive power and case studies of individual railroads' changes in operating practices are given.

Malone, F *Railway Age* Vol. 180 No. 15, Aug. 1979, pp 16-19

ORDER FROM: ESL

DOTL JC

16 300633
CRANKCASE LUBRICANTS FOR FOUR-CYCLE RAILROAD AND MARINE DIESEL ENGINES
The diesel engines used as power plants for US designed diesel electric locomotives are among the highest output rating in use for any application. In 1965, highly dispersant lubricating oils were first introduced to the railroad industry. Since that time, the engine output rating of the four-cycle railroad diesel engine has increased from 14.6 kg/sq cm (207 psi) BMEP to 19.9 kg/sq cm (282 psi), principal components have been changed in design and there has developed a world distillate fuel shortage. To meet these changes, engine lubricants with improved performance features were required, were developed and are now available. The lubrication of the 7FDL four-cycle diesel engine manufactured by the author's company over this time span is discussed form the viewpoints of: fundamental crankcase lubricant performance requirements, lubricant performance improvements and used crankcase oil condition monitoring. Particular emphasis is given to corrosive wear control and deposit control, both of which can be adversely affected by changing distillate fuel properties.

Hoffman, JG (General Electric Company) *Lubrication Engineering* Vol. 35 No. 4, Apr. 1979, pp 189-197, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

16 301161
SAVING OF ENERGY RESOURCES IN RAILWAY FREIGHT SERVICES [Rezul'taty ekonomii toplivno-energeticeskih resursov v gruzovom hozjajstve dorog]
Organisational and technical measures for energy saving in the SZD freight services, which resulted in a saving of 9 million kWh of electric current in 1978. [Russian]
Serie: Gruzovaja i kommerceskaja rabota.

Sorokin, SV *Zheleznodorozhnyi Transport* No. 2, 1979, pp 25-26
ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

16 301604
URBAN TRANSPORTATION PLANNING UNDER ENERGY CONSTRAINTS
Current knowledge concerning the impact of limited fuel availability on urban travel behavior is reviewed, and the application of this information to urban transportation planning is discussed. The 1973-1974 oil embargo is viewed as a short-term perturbation in the energy-transportation system that resulted in temporary changes in travel behavior. Short-range energy contingency planning can benefit most from the knowledge gained during this period. Energy contingency planning should emphasize non-capital-intensive policies that can be easily and quickly implemented to conserve fuel. The information gained during the embargo does not appear to be directly applicable to long-range urban transportation plans do not appear practical at this time because of the lack of information concerning the impacts of fuel availability on travel and living patterns. It may therefore be more beneficial to develop plans that have the flexibility to include this information as it becomes available. A standardized definition of fuel availability should be determined, and a mechanism for capturing fuel allocation and consumption statistics on a disaggregate level should be established. Trends in the attitudes of consumers toward the energy situation and transportation-related behavioral changes that result from these perceptions should also be monitored. /Author/

This paper appeared in Transportation Research Record No. 707, Urban Transportation Planning, Evaluation, and Analysis.

Witkowski, JM Taylor, WC (Michigan State University, East Lansing) *Transportation Research Record* No. 707, 1979, pp 1-5, 1 Fig., Refs.

ORDER FROM: TRB Publications Off

DOTL JC

16 301712
EXPLOITATION OF ELECTRIC TRACTIVE UNITS IN SERVICE [Ausnutzung elektrischer Triebfahrzeuge im Betrieb]
Energy costs represent about 40 to 60 percent of the total costs of train running. The introduction of semi-automatic processes, automatic starting, speed regulation, traffic and braking control, aimed at optimum train control from the energy point of view is intended to relieve the operator from the need to carry out the routine movement of controls and to increase the performance of electric and mechanical equipment whatever the operating conditions. The conditions required for optimum train running are explained, together with possibilities for improving train operation. [German]

Amos, M Kahler, P *Schienenfahrzeuge* Vol. 23 No. 3, May 1979, pp 124-128, 1 Tab., 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13/14, Postfach 1235, 108 Berlin, East Germany

16 301725
PERRFORMANCE AND FUEL CONSUMPTION OF DIESEL TRACTIVE UNITS WITH REFERENCE TO THE TRACTIVE UNIT'S AREA OF OPERATION [Leistung und Kraftstoffverbrauch von Bahndieselmotoren in Abhaengigkeit vom Einsatzgebiet des Triebfahrzeugs]
Effects of atmospheric factors, such as pressure, air temperature and humidity, and of climatic conditions on the performance and fuel consumption of diesel engines. [German]

Gaertner, E Vorbau, G *DET Eisenbahntechnik* Vol. 27 No. 6, 1979, pp 250-253, 4 Fig., 5 Tab., 7 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Atlas for Action Books, Incorporated, 162 Fifth Avenue, New York, New York, 10010

16 301843
RAILWAYS AND ENERGY
The author discusses efforts which can be made to prevent a possible energy crisis in industry with special reference to railway systems. An examination of a railway system shows opportunities to save money and energy by taking over transport work from other carriers. Railway systems are relatively small energy consumers in relation to their transportation work performed. To save energy such a system can either reduce part of its work or take over the work of other carriers with higher specific energy consumption such as trucks over long distances. Work redistribution can also be achieved by taxation of trucks to pay for social and road maintenance costs. /TRRL/

Lundberg, AS *Rail International* Vol. N Jan. 1979, pp 17-25, 2 Fig.

ACKNOWLEDGMENT: TRRL (IRRD 241534)
ORDER FROM: ESL

DOTL JC

16 302242
TRANSPORTATION ENERGY OVERVIEW: EMPHASIS ON NEW YORK STATE
This paper summarizes recent work by the New York State Department of Transportation on transportation energy analysis, consumption, and conservation. Current uses and sources of American transportation energy are reviewed. Particular emphasis is on New York. Transportation energy (gasoline, diesel, and jet fuel) comes primarily from domestic sources, Africa, and the Middle East, and is used primarily for automobiles, commercial vehicles, and air travel. New York uses a relatively higher share of transportation energy in transit and air travel than does the rest of the United States. The paper also shows gasoline use by trip purpose and location in upstate New York, describes baseline transportation energy forecasts and the importance of increased automobile fuel efficiency on conservation, and reviews public attitudes toward conservation and changes in travel behaviour during the energy crisis of 1973-1974. Possible conservation actions and their potential are also summarized. /Author/

This paper appeared in TRB Record No. 710, Current Issues in Statewide Transportation Planning.

Hartgen, DT (New York State Department of Transportation) *Transportation Research Record* No. 710, 1979, pp 26-33, 4 Fig., 7 Tab., 17 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

16 302705
EFFICIENCY OF UTILIZATION OF TRACTION ENERGY IN URBAN PUBLIC TRANSPORTATION [Efficienza di utilizzazione dell'energia di trazione nei trasporti pubblici urbani]
The relative efficiency of utilization of traction energy by three most important means of public transportation: subway, streetcar, and bus, is considered and compared. The data on urban transportation services in Milan are analyzed. Formulas for the evaluation of efficiency of energy utilization by different modes of urban transportation are derived. It is found that that the efficiencies of the bus and streetcar are about equal and amounting to about a half of that of the subway. On the other hand, the bus is the most flexible means of urban transportation. [Italian]

Mazzon, L *Ingegneria Ferroviaria* Vol. 34 No. 1, Jan. 1979, pp 44-51, 9 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

16 303592
ENERGY FOR FUTURE TRANSPORT. PARTS I AND II
In this report an attempt is made to survey the whole field of energy for transport on a world basis. The periods for which fuel will last and its use be economical are considered. Reference is made to the unique position occupied by oil, and to the reserves, the cost of exploration and extraction of oil in the North Sea area. The author also considers shale and tar sands as oil sources together with "syncrude"-the liquid fuel derived from coal. Brief reference is made to such sources of liquid fuel as alcohol, and the possible use of various gases for the propulsion of transport vehicles. Coal and nuclear power are regarded as the potential energy sources for the future. Electricity is considered to be the dominant means of using energy after the oil era. A section is devoted to future transport in Britain and the need for the development of British railways, with their conversion from oil to electricity. Urgent action is considered essential. Part II of the report consists of appendices as follows: (a) sources, quotations and statistics, (b) abbreviations and equivalents, (c) historical sources of energy and future possibilities, (d) storage batteries for road transport, (e) capital requirements, (f) special problems in remote areas.

Wayne, F

Scottish Association for Public Transport Monograph Sept. 1978, 43 p., Tabs., 14 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 243222)
ORDER FROM: Scottish Association for Public Transport, 113 West Regent Street, Glasgow, Scotland

P7909059& P7909060

16 303639
LIFE WITHOUT OIL [Vivre sans petrole]
After analysing the features of the oil and energy crisis, the author examines possibilities for alternative fuels. In conclusion he attempts to visualise the transport situation in 2050, when the railways will have proved their superiority in the fields of low energy consumption, safety and protection of the environment. [French]

Gregoire, JA
Flammarion et Cie UIC Cat. 20 N 77, 1979, 221 p.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Flammarion et Cie, 26 rue Racine, F-75006 Paris, France

16 303658
TRACTION MOTOR GEAR LUBRICATION REQUIREMENTS AND DEVELOPMENTS
The basic arrangement of the final drive gear system of domestic main line diesel electric locomotives has remained unchanged over the years. During this same time period, the ratings of these locomotives and demands on the gear train have increased considerably. Due to space limitations, interchangeability and retrofit requirements, the changes made to handle the increased power involved subtle but significant changes to gearing, gear case design and the gear lubricant. The purpose of this paper is to present some of the developments in the above areas which include metallurgical improvements, gear geometry changes, and lubricant specifications which the author's company has recently revised by changing from a sodium soap to a lithium soap thickened grease. The new specification also calls for minimum Load Wear Index and Weld Point values that require the use of EP additives. The reasons for adopting the new lubricant specification are presented with a discussion of items where additional development work is required to provide further improvement in gearing and gear lubrication.

Christianson, WA (General Motors Corporation) *Lubrication Engineering* Vol. 35 No. 6, June 1979, pp 303-308, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

16 303859
ENERGY CONSUMPTION OF RAIL RAPID TRANSIT: AN ANALYSIS OF THE BART EXPERIENCE
This paper documents and analyzes the operating energy consumption of the San Francisco Bay Area's new rapid-transit system; it briefly compares BART's energy consumption with that of other rail rapid-transit systems and includes a partial analysis of energy consumption of BART, bus, and automobile in one travel corridor of the Bay Area using recent data on actual passenger volumes. Components of operating energy in BART that are considered are: station energy, maintenance energy, and traction energy. Basic conclusions are: in terms of energy consumed per seat-mile provided, BART is less fuel-efficient than bus but much more efficient than automobile; and in a major travel corridor of the Bay Area where much of BART's ridership come from buses, where automobile occupancy is high, and where BART's load factors in the peak period/reverse direction and off-peak are low, the actual energy savings due to BART are much smaller than the potential. And if the many new trips apparently induced by BART are taken into account, the net energy savings may be negligible.

From International Conference on Energy Use Management, October 24, 1977, Tucson, Arizona.

Ellis, RH Sherret, A (Peat, Marwick, Mitchell and Company)
Pergamon Press 1978, pp 397-417

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

16 303860
PUBLIC TRANSPORTATION: PATH AS AN EXAMPLE
The PATH rail-transit system (Port Authority Trans-Hudson system) is a 14-mile long, 70-year old heavy rail rapid-transit system operating in the New York Metropolitan area. The operational and technological programs to conserve energy in the last few years are described. The paper first concentrates on PATH itself, based largely on propulsion energy and utilization of the system. The second part reflects regional perspectives. PATH's primary energy source is electricity. Only insignificant amounts of other energy are consumed, primarily space heating at various maintenance facilities or for use in various vehicles operated by PATH. Data are sparse that identify the energy effectiveness of other rail-transit systems for peak versus off-peak services; but with some data, comparisons are made with PATH performance-other systems in the Northeast and some foreign systems. The simplest and quickest way to improve rail-transit's Btu-per-passenger-mile effectiveness is to adopt policies that would increase its utilization, the author says.

From International Conference on Energy Use Management, October 24, 1977, Tucson, Arizona.

Smith, DT
Pergamon Press 1978, pp 419-429

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

16 303861
INTERCITY RAILROAD ENERGY CONSERVATION
Although intercity freight railroading accounts for just over 3% of transportation petroleum fuel use in the United States, energy-conservation measures are nevertheless an attractive investment for the railroad industry, which uses only a small number of locomotives to provide motive power. The paper describes the patterns of energy use in intercity freight railroad transportation and identifies energy-conservation measures that can be taken in the following areas: (1) operations-improved fuel and train handling, reduction of locomotive idle time, planning individual train consists; (2) equipment design and technology-diesel locomotive waste heat recovery, energy storage and regeneration, lighter weight equipment; (3) regulation-consideration of energy conservation in regulatory proceedings; and (4) intermodal systems and modal choice-rationalization of transportation modal use in intercity freight transportation, truck-rail intermodal system development, and implementation of measures that will make railroad service more useful to shippers.

From International Conference on Energy Use Management, October 24, 1977, Tucson, Arizona.

Moon, AE (Stanford Research Institute)
Pergamon Press 1978, pp 467-480

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

16 303867
ENERGY: WHAT ROLE FOR THE RAILS?
The new era of energy scarcity presents a serious challenge to the highway-oriented transportation system of the U.S., producing a potential for significant diversions of both freight and passenger movements to more energy-efficient rail transportation. Railroads will also have the opportunity for greatly improving their participation in the movement of coal and possible other energy resources. Will the private-enterprise freight sector and socialized passenger sector have the vitality, enterprise and financial ability to meet these needs?

Shedd, T *Modern Railroads/Rail Transit* Vol. 34 No. 11, Nov. 1979, pp 37-42, 4 Phot.

ORDER FROM: ESL

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16 303868
SEARCH FOR SAVINGS
With rising fuel costs railroads are stressing energy conservation, not only in train service but also in lighting, heating and air conditioning of shops and offices, in compressed air and electrical power supplies, and in locomotive fueling, standby engine protection and other places. Train performance is being closely monitored and altered. Some roads have active promotion campaigns for energy conservation.

Shaffer, FE *Modern Railroads/Rail Transit* Vol. 34 No. 11, Nov. 1979, pp 48-50, 2 Phot.

ORDER FROM: ESL

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16 304153
TRANSPORTATION ENERGY CONSERVATION DATA BOOK: A SELECTED, ANNOTATED BIBLIOGRAPHY, EDITION 3
As a companion volume to the Transportation Energy Conservation Data Book, Edition 3 (ORNL-5493), this bibliography provides references on energy consumption by major transportation modes; conservation alternatives; research, development, and demonstration of alternate modes of transportation and fuels; and other factors influencing energy utilization in the transportation sector. Reviews of ten selected studies documenting energy use by different transportation modes are included in this bibliography. Reports sponsored by the Department of Energy, Division of Transportation Energy Conservation, are listed in a separate section. These references are also included in the main bibliography.

Ehrenshaft, AR Barber, BY Carroll, PJ Plemons, LK Purnell, PA Oak Ridge National Laboratory, Department of Energy Nov. 1978, 283 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ORNL/EIS-146

16 304702
FREIGHT TRANSPORTATION ENERGY USE
No abstract available.

Set includes PB-301153 thru PB-301156, Volumes I thru IV as RRIS 16 304703 thru RRIS 16 304706 respectively; Bulletin 8001.

CACI, Incorporated, Transportation Systems Center, Department of Transportation 4 Volumes, July 1979, 563 p.

ACKNOWLEDGMENT: NTIS
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PB-301152-SET/ST

16 304704
FREIGHT TRANSPORTATION ENERGY USE. VOLUME II-METHODOLOGY AND PROGRAM DOCUMENTATION
The structure and logic of the transportation network model component of the TSC Freight Energy Model are presented. The model assigns given origin-destination commodity flows to specific transport modes and routes, thereby determining the traffic load placed upon each network element, and produces transportation cost, transit time, and energy-use estimates at several levels of detail. User and programmer instructions, including input data formats, program computation methods, and program output descriptions and examples are provided.

See also Volume 1, PB-301153 and Volume 3, PB-301155. Sponsored in part by Department of Transportation, Washington, DC. Office of Systems Engineering. Also available in set of 4 reports PC E12, PB-301 152-SET.

Bronzini, MS Miller, RC
CACI, Incorporated, Transportation Systems Center, Department of Transportation Final Rpt. DOT-TSC-OST 79-1VOL2, July 1979, 227 p.

Contract DOT-TSC-1252-2

ACKNOWLEDGMENT: NTIS
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PB-301154/1ST

16 304705
FREIGHT TRANSPORTATION ENERGY USE. VOLUME III-FREIGHT NETWORK AND OPERATIONS DATABASE
The data sources, procedures, and assumptions used to generate the TSC national freight network and operations database are documented. National rail, highway, waterway, and pipeline networks are presented, and estimates of facility capacity, travel speed, fuel consumption, and average cost are made. Commodity characteristics and interregional flows are also presented.

See also Volume 2, PB-301154 and Volume 4, PB-301156. Sponsored in part by Department of Transportation, Washington, DC. Office of Systems Engineering. Also available in set of 4 reports PC E12, PB-301 152-SET.

Bronzini, MS
CACI, Incorporated, Transportation Systems Center, Department of Transportation Final Rpt. DOT-TSC-OST79-1VOL3, July 1979, 136 p.

Contract DOT-TSC-1252-3

ACKNOWLEDGMENT: NTIS
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PB-301155/8ST

16 304706
FREIGHT TRANSPORTATION ENERGY USE. VOLUME IV-ANALYSIS OF SELECTED ENERGY CONSERVATION OPTIONS
The TSC Freight Energy Model is applied to a preliminary analysis of two energy conservation options: (1) increased use of Run-Through TOFC rail service; and (2) use of double 40-foot trailers on all divided highways. These options are examined primarily within the limited context of competition for movement of intercity freight which presently moves in single trailer highway service.

See also Volume 3, PB-301155. Sponsored in part by Department of Transportation, Washington, DC. Office of Systems Engineering. Also available in set of 4 reports PC E12, PB-301 152-SET.

Bronzini, MS
CACI, Incorporated, Transportation Systems Center, Department of Transportation Final Rpt. DOT-TSC-OST-791VOL4, July 1979, 140 p.

Contract DOT-TSC-1252-4

ACKNOWLEDGMENT: NTIS
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PB-301156/6ST

16 304748
ENERGY CONSIDERATIONS IN TRANSPORTATION PLANNING
This report provides both a general background of the present energy situation and a discussion of alternative energy conservation strategies. The background section deals with energy supply and demand, balance of payments, and transportation revenue implications. The strategies section looks at energy conservation measures related to passenger and freight transportation, including discussions on contingency planning and public education.

Jilek, G Osborne, R
Federal Highway Administration Final Rpt. FHWA/PL-79/017, Mar. 1979, 46 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB80-101769

16 307647
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 builders and the engine users will continue to grow as a result of mounting concern for environmental protection and resource conservation.

Presented at the ASLE Annual Meeting, 34th, St. Louis, Missouri, April 30-May 3, 1979.

Blatz, FJ Pedall, RF *American Society of Lubricating Eng-Preprints* ASLE 79-AM-6E-1, 1979, 7 p., 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: American Society of Lubricating Engineers, 838 Busse Highway, Park Ridge, Illinois, 60068

17 053333
ORE COLLOQUIA. REPORT ON THE SEVENTH ORE COLLOQUIUM "TECHNICAL COMPUTER PROGRAMS" DRESDEN, 26TH TO 28TH SEPTEMBER 1978

The report contains the summaries of 14 papers on computer programs relating to the following subjects: Preparation of train routing schedules, taking into account the train categories fixed and the Economic application of computers within the scope of the scientific work. To each summary is added the appropriate program sheet. A synopsis of each paper is added to the report.

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

International Union of Railways AZ 40/RP 9, Oct. 1978, v.p.

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17 198206
AGGREGATION IN NETWORK MODELS FOR TRANSPORTATION PLANNING

This report documents research performed on techniques of aggregation applied to network models used in transportation planning. The central objective of this research has been to identify, extend, and evaluate methods of aggregation so as to improve the capabilities of the transportation planner by better computational methods, by more flexible models, and by increased confidence in the results obtained from aggregated models. The results of the research are presented in a series of papers. Papers 1 and 2 address the question of error bounding in the lifted (disaggregated) solution using the application of duality theory. Paper 3 reviews the potential performance of a new algorithm for the equilibrium model using path extraction aggregation. Paper 4 addresses potential savings of aggregation. Paper 5 presents results on aggregation test networks and attempts to formulate rules for equilibrium models. Papers 6 and 7 present specific mathematical results on two aggregation-related problems.

Cullen, D Kuhn, H Frank, M
Mathematica, Incorporated, Transportation Systems Center Final Rpt. DOT-TSC-RSPD-78-7, Feb. 1978, 136 p.

Contract DOT-TSC-883

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-296887/3ST

17 198213
NETWORK AGGREGATION IN TRANSPORTATION PLANNING MODELS

This report contains six papers addressed at mathematical and computational aspects of an extraction aggregation model often employed in transportation planning studies. This model concerns the optimal flowing of an extracted subnetwork of a given network. Nonlinear decompositions are developed, duality theory is explored as a tool for measuring error, and heuristic methods are tested. An overview section summarizes prior work on network aggregation and the six papers of this report.

Barton, RR Hearn, DW
Mathematica, Incorporated, Transportation Systems Center Final Rpt. DOT-TSC-RSPA-79-18, June 1979, 144 p.

Contract DOT-TSC-1443

ACKNOWLEDGMENT: NTIS
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17 301427
CHANGES IN INTERNATIONAL FREIGHT CAR MARKING
[Modifications apportees au marquage international des wagons]

The uniform marking of hauled stock, introduced between 1964 and 1968 in accordance with UIC standards, makes it possible to identify any one wagon from its number amongst all those operating in Europe. But the considerable development and diversification of car fleets, and the need for other information to meet the requirements of sophisticated computerized management have led to a complete revision of the coding. Changes in markings will be begun on 1 January 1980, and will continue gradually over a 5-year period. [French]

Michel, J-P Schubert, G *Revue Generale des Chemins de Fer* Vol. 98 May 1979, pp 257-262, 4 Phot.

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

DOTL JC

17 302138
MOFA-MODERNISED TICKET ISSUING ON THE DB

The many possible applications of EDP, especially in microprocessor equipment, have led to new sales methods at the DB. This year they begin with the MOFA (modernized ticket issuing) project, the aim of which is to modernise and rationalise all ticket-issuing activities. The article describes the requirements, conditions, concept, technique, extent of equipment, maintenance methods, execution, profitability, presentation and project organisation of MOFA. In the main, the concept is that at all issuing offices the tickets for local train services will largely be issued from zone-oriented ticket machines. The larger offices will have TA 1069 data stations for producing tickets, while medium-size and small offices will have simpler ticket printers with data recording. The MOFA project has a wide regional spread and affects many departments of the DB. For its rapid introduction and smooth working a special project organisation was therefore required. The article describes the existing organisational form, for which the project management is at the top level, and also the new organisational form for putting the project into practice, for which the project management will be at the middle level. [German]

Schuster, E *Eisenbahntechnische Rundschau* Vol. 28 No. 5, May 1979, pp 407-414

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

DOTL JC

17 302145
AUTOMATION IN RAILWAY ENGINEERING

The father of Cybernetics, Norbert Wiener, said that the difference between mechanization and automation is the difference between mechanising muscle out of the workplace and mechanising the processing of information and decision-making. The areas where automation can be applied to the railway are numerous. Modern diagnostic techniques using the microprocessor as a controller and decision maker are now available for automated testing and maintenance and opportunities for such systems will grow.

Dobbs, DJM *Railway Engineer International* Vol. 4 No. 3, May 1979, pp 49-50

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

17 302356
AN AUDIT OF CAR UTILIZATION

An audit of car utilization, envisioned as a supplement to existing control systems, would monitor both utilization and financial performance parameters and give management a better understanding of the dynamic relationship between these two factors. The audit as presented, involves an interdepartmental, interdisciplinary management committee and recommends the data base and organizational design which will satisfy the information needs of such a group. The concept has been tried on Boston and Maine Railroad.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Nowicki, V (Multisystems, Incorporated)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 315-321, 2 Fig., 1 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

17 302357
CAR CYCLE ANALYSIS SYSTEM

This paper describes the Car Cycle Analysis System which collects and analyzes data on movements of selected freight cars. This System has been developed to measure the car cycle, both interline and local, and also its components such as shipper time and terminal time. As part of the Freight Car Utilization Research-Demonstration Program, it has collected data on approximately 8,500 cars.

Proceedings of the Twentieth Annual Meeting of the Transportation

Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Gurskis, JJ Fend, AV Tuve, RF
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 322-330

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

17 302360
A MULTI-COMMODITY, INTERMODAL TRANSPORTATION NETWORK MODEL
A multi-commodity network flow model has been constructed that incorporates a double node numbering system to represent transfers at nodes. Path utilities, described in terms of transport cost, transport time and time variance are given an exponential form and inserted into a mode abstract, multinomial logit modal split formula. A modified shortest path routine identifies preferred commodity specific paths for conventional transport modes, advanced transport modes and intermodal combinations. Network data for the model are obtained from existing sources. Modal split coefficients are calibrated using data from a national commodity flow data base. The model is used as part of an overall planning procedure for economic development and transportation planning of a multi-state transportation system that extends from Brunswick-Jacksonville to Kansas City.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Sharp, GP (Georgia Institute of Technology)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 399-407, 1 Fig., 1 Tab., 20 Ref.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

17 302369
CHESSIE COMPUTERIZES M/W PLANNING
A computerized Engineering Information System being introduced by Chessie System will organize track maintenance projects for up to three years with better utilization of all resources--manpower, machines and materials. Maintenance gang operation will be directed on a week-by-week basis and major track renewal projects up to three years in advance. While initially track maintenance is covered, it is planned that eventually bridge and building, and signal and communications projects will come under computer planning and control.

Progressive Railroading Vol. 22 No. 10, Oct. 1979, pp 62-66, 5 Phot.

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

DOTL JC

17 302370
CN BOOSTS CAR UTILIZATION
Canadian National utilizes information gathered by its TRACS computerized car reporting system to produce a weekly Current Fleet Action Report that is facsimiled across the system for all those involved in better freight car utilization. It is used as the basis for moving and repairing cars, indicating the groups which are in surplus or shortage status.

Progressive Railroading Vol. 22 No. 10, Oct. 1979, pp 109-111

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

DOTL JC

17 302713
DUTIES AND AIMS OF THE MECHANICAL-AND ELECTRICAL-ENGINEERING SERVICE WITHIN THE INTEGRATED TRANSPORT CONTROL SYSTEM (ITS) [Aufgaben und ziele des maschinen-und elektrotechnischen dienstes im ITS]
Steps taken by the West German Railroad System towards improving its transportation services are reported. During the past decades a great step towards the improvement of economy has been taken by the structural change within the traction service. A new structural change, the rationalization of transport information, is occurring by the introduction of the Integrated Transport Control System (ITS). In addition, electronic data processing offers new possibilities of storage, processing and data transmission. [German]

Dahms, D *Elektrische Bahnen* Vol. 50 No. 3, Mar. 1979, pp 58-65, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

17 303253
UP AUTOMATES CREW CALLING
Union Pacific's Centralized Crew Management System is designed to consolidate crew dispatching functions within each of the three geographic districts of the railroad, replacing manual boards with electronic video displays. The system improves crew calling efficiency by utilizing computers and developing uniform procedures wherever practical. The system will be responsive to changes, provide a data base on Train, Engine and Yard personnel, and provide management reports for effective control. It also will reduce time claims and clerical costs.

Progressive Railroading Vol. 22 No. 11, Nov. 1979, pp 51-59, 2 Phot.

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

DOTL JC

17 303626
INTEGRATED USE OF DATA IN RAILWAY COMPUTER CENTRES [Integrirovannoe ispol'zovanie dannyh v doroznyh vycislitel'nyh centrah]
Under Stage Two of the automated management system for Soviet rail transport (ASUZT), over 100 typical tasks must be resolved by 1985, especially at computer center level. Between 1978 and 1982, it is planned to set up traffic management sub-systems (ASU-D) in Railway computer centers. The article gives a table showing 24 main tasks for the ASU-D sub-system and other sub-systems closely connected with traffic. The problem of setting up data banks to deal with these tasks is also discussed. [Russian]

Tulupov, LP *Vestnik VNIIZT* No. 1, 1979, pp 1-5, 2 Fig., 2 Tab., 1 Ref.

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

17 304584
STUDY OF SET-THEORETIC INFORMATION PROCESSING
This report by Set Theoretic Information Systems, Inc., was prepared in partial fulfillment of their contractural obligations to the Data Management Research Project of the Lawrence Livermore Laboratory, in behalf of LLL-Contract (RA) 76-12 for the Transportation Systems Center of the U.S. Department of Transportation. The main contract explored efficient means to identify and analyze the large collections of historic data which document the transport of goods and people by ships, planes, trains, and trucks. One approach under consideration was the use of extended set theory and software developed by Set Theoretic Information Systems. In this report the author addresses himself to seven tasks that range from a definition of the set-theoretic data manipulation concepts to the practical task of working with the CAB 586 Flight Service Segment Data Base. (ERA citation 04:038859)

Childs, DL
STIS Corporation, Department of Energy Mar. 1978, 97 p.

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

UCRL-13970

17 304797
INTERMODAL MANAGEMENT INFORMATION SYSTEM (IMIS). PHASE III, TASK 1: BASELINE SPECIFICATION
The document presents the system design of the IMIS. To assist the potential user in assessing system capabilities, it describes what the system will do and what a user must provide. The document is also a tool for the application analyst/programmer to use in developing detailed specifications and computer programs. A top-down design was accomplished, utilizing structured design techniques to describe the system in terms of its logical functional components. The system is modular and includes those functions considered critical to effective management and control of intermodal activities. It is a composite of three systems which can be used together or

individually. These are (1) an intermodal equipment control system, (2) a repetitive waybilling and rating system, and (3) a profit analysis system. Each system functions independently of the others and may be used to interface with relevant information systems that already exist or are planned for the railroad. A major system objective is to supply a foundation or baseline from which the railroad may draw those features desired for its own situation. The design is constructed to permit supplemental functions to be readily incorporated by a railroad, if desired.

Prepared in cooperation with Norfolk and Western Railway Co., VA.

Peternick, J Fredrickson, V Pflugrad, A Rynders, B Dillenback, D

PRC Systems Sciences Company, Federal Railroad Administration Final Rpt. FRA/ORD-79/21, PRC/SCC-C02936, Sept. 1979, 267 p.

Contract DOT-FR-741-5157

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB80-107022, DOTL NTIS

17 307667

COMPUTER SCIENCE AT THE SNCF [L'informatique a la SNCF]

At the SNCF, computer science at present involves nearly a thousand people, about 120 computers and above all, a considerable budget of over three hundred million francs, representing about 1.3% of SNCF expenditure. One third of this figure is spent on staff, the expenditure on energy is also very considerable. The amount of SNCF computer work can also be judged by the paper used by the computers which totals over 1000 tons a year. [French]

Dreyfus, H Verresen, G *Informatique Nouvelle* July 1979, pp 21-27, 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Editions d'Informatique, 82 rue Lauriston, 75116 Paris, France

17 308298

NEW CODING SYSTEM FOR CARLOAD TRANSPORT [Das neue Richtpunktverfahren im Wagenladungsverkehr]

A new extended digital coding system has been introduced for national and international carload transport. Continuous car operating data provides a marked improvement in the service quality for international freight traffic. This new procedure creates simultaneously the conditions for a complete transformation of commodity lists, technical documents for train formation and planned control systems by means of computerized data processing. [German]

Deinhardt, H Buerger, R *Die Bundesbahn* Vol. 55 No. 10, 1979, pp 711-716, 8 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

18 300544
RAILROADS AND SEASONAL PEAK PRICES: THE DILEMMA OF PRIVATE EQUIPMENT
Problems and potential of peak-period rates as they would be used by railroads are analyzed, identifying basic principles of demand responsive pricing by utilities in general and railroads specifically. A major difference for railroads is the use of privately owned cars and the impact of this equipment is examined relative to an experimental peak-period rate system proposed by southern railroads. Alternatives are suggested that could remedy many of the problems and improve equipment utilization.

Beier, FJ (Minnesota University, Minneapolis) *ICC Practitioners' Journal* Vol. 46 No. 5, July 1979, pp 684-698, 6 Tab.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

DOTL JC

18 301066
METHOD FOR ESTIMATING NONPHYSICAL, TRANSPORTATION-RELATED BUSINESS LOSSES CAUSED BY FLOODING ON THE INLAND RIVER SYSTEM
Research undertaken to develop and document a methodology for the estimation of secondary transportation-related flood losses to commercial and industrial firms is reported. The categories of loss estimated exclude physical damage, which is already included in current methodologies. The methodology categorizes transportation-related flood losses into three broad areas. The first area is losses in travel time and travel cost-estimated costs of additional route circuity and travel time, primarily for the movement of freight. The second area is that of business interruption losses, which relate to transportation in the sense that access is essential to the functioning of businesses. The third area of loss is consequences of flood conditions that are not measured solely in dollars. Typical of this category might be increases in energy consumption or air pollution as a result of flood conditions. /Author/

This paper appeared in TRB Research Record No. 704, Inland Waterway User Charges, Port Development, and Research Methodologies.

Haefner, LE Hutchins, L Yarjani, B (Washington University, St Louis); Meyer, RW (National Marine Services, Incorporated) *Transportation Research Record* No. 704, 1979, pp 24-32, 4 Fig., 4 Tab., 6 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

18 301142
WHEN DOES PIGGYBACK TRANSPORT PAY OFF? [Wann lohnt sich Huckepackverkehr?]
In order to make an economic assessment of intermodal transport, the three intermodal techniques for articulated vehicles-loading by driving into position, for semi-trailers-loading by driving into position or by crane, and for detachable tanks-loading by crane, are considered separately. A pre-requisite for each calculation is a time related vehicle cost calculation. The relative cost of intermodal transport should be compared at regular intervals with that of highway transport. Another important factor of comparison is the journey time. Experience demonstrates that with longer distances the economic advantages lie with combined rail/road transport. The advantages of the road/rail intermodal transport are better use of transport concessions and above all, the possibility in the case of longer distances, to adhere to the time requirements. The reduction obtained for empty loads must be seen as the positive factor, where such transport is correspondingly paid for as one-way traffic. Unfavourable factors are the restrictions caused by the railway timetables and the often under-estimated, unknown preliminary and subsequent costs. In this case only an exact cost analysis of the vehicles used will help. A further development of rail/road traffic and the resulting relief to the highways will depend finally on whether it will be found possible to offer attractive options to transport carriers. This involves both a flexible price policy and a further improvement in the timetables by an extension of the rail/road stations. /TRRL/ [German]

Lastauto Omnibus Vol. 55 No. 4, Apr. 1978, pp 60-62, 3 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-307899), 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

18 301160
ECONOMIC PREMISES USED BY THE GERMAN FEDERAL RAILWAY FOR OPERATING THE SYSTEM [Betriebswirtschaftliche Unternehmensdaten fuer die Deutsche Bundesbahn]
The characteristic figures involved are numerical values which express a phenomenon in quantity and quality terms, through the use of several orders of magnitude. They make it possible to monitor economic performance and productivity trends, in addition to being a comparison instrument where operating is concerned. A new system has been developed on the DB articulated according to transport sector and category and integrating all the characteristic figures worked out. This article presents and describes the new system, using examples to show the relevance and application possibilities of the characteristic figures. [German]

Gschwendtner, W *Die Bundesbahn* Vol. 55 No. 5, May 1979, pp 361-366, 11 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

18 301611
DISCRETE OPTIMIZATION IN TRANSPORTATION NETWORKS
In most cases, planning capital investment in transportation networks is an unwieldy job because the number of investment options grows so rapidly. The real situation faced by the transportation planner is, in general, when, where, and by how much to allocate available resources. The transportation investment problem can be characterized as the location and timing decisions to be made by the planner. A branch-and-backtrack algorithm is presented that tackles both location and timing aspects of the capital investment problem in small and medium transportation networks. The results presented are encouraging for future research in which the technique can be applied to larger, actual transportation networks. /Author/

This paper appeared in Transportation Research Record No. 707, Urban Transportation Planning, Evaluation, and Analysis.

Lago, PAR (PROMON Engenharia, S.A.) *Transportation Research Record* No. 707, 1979, pp 33-39, 6 Fig., 5 Tab., Refs.

ORDER FROM: TRB Publications Off

DOTL JC

18 301824
PRICING PRIVATE FREIGHT CAR SERVICE: AN ANALYSIS OF TRANSPORTATION USE AND THE PROBLEM OF STANDBY CAR CAPACITY
The ICC objective in formulating car compensation is to reimburse owners for the transport-related costs of car ownership. In the case of private cars, the primary issue in defining transportation use is allocation of the cost of standby capacity. The dual function of most private cars--transportation and storage--is not a justification for the owner's assuming all surplus costs but for excluding surplus costs generated from the storage function (oversized fleets). Since private freight cars now constitute one-fifth of the fleet and the ratio is growing, the compensation problem is also increasingly complicated. A car-hire model is developed that incorporates a standard utilizaton ratio--a concept originally developed by AAR Per Diem Task Force I and that has the capability of partitioning surplus days of peak load and oversized fleet categories into the present AAR car-hire framework. A second modification of this ratio adjusts the length of the peak period.

Tyworth, JE (Pennsylvania State University, University Park) *ICC Practitioners' Journal* Vol. 46 No. 6, Sept. 1979, pp 789-800, 3 Tab.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

DOTL JC

18 301836
A STUDY OF TRANSIT FARE POLICIES, FARE STRUCTURES, AND FARE COLLECTION METHODS
The project involves the studying and bringing together of material on the three elements of transit revenue collection: fare policies, fare structures, and fare collection methods. Theoretical aspects and practical experiences are both examined. Another objective of the project is to determine whether or not there are deficiencies in existing fare collection methods which constrain their usefulness. The authors find a significant lack of uniformity in fare policies. /TRRL/

Department of Transport, Canada Monograph Apr. 1978, 261 p., 36 Fig., 26 Tab., 66 Phot., 86 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241554), Roads and Transportation Association of Canada
ORDER FROM: Department of Transport, Canada, Urban Transportation Research Branch, Place de l'Aviation, Montreal, Quebec H3A 2R3, Canada

18 302174
COST-REVENUE SQUEEZE IN AMERICAN PUBLIC TRANSIT
A review is presented of the history of financial difficulties in the transit industry and finds that they are not of recent vintage, nor are they simply attributable to the increasing popularity of the automobile. Case studies of four large transit operators are employed to illustrate recent patterns of cost escalation, effectiveness, and efficiency in public transportation. Broad conclusions are drawn regarding potential areas for improvement in transit subsidy policy.

Ortner, J (California University, Irvine); Wachs, M *Journal of the American Planning Association* Vol. 45 No. 1, Jan. 1979, pp 10-21, 24 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 302344
RESEARCH RESULTS CONCERNING AN ANALYSIS OF THE EFFECT OF ALTERNATIVE FACTORS ON EASTERN UNIT TRAIN COAL RATES
This study is a statistical development of unit train rates by (1) examining relative levels of rates in relation to various cost and competitive factors; (2) identifying key factors used by railroads in setting rates; (3) determining which rates might be out-of-line in comparison with general unit-train rate levels; and (4) identifying relations between rates and rate factors for estimating the level or rates for new coal movements. While simulation has been used by railroads for detailed costing and rate-making, this approach offers a less expensive method for achieving shipper-utility direction in analyzing the level or rates.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Marien, EJ (Wisconsin University, Madison)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 86-92, 2 Fig., 4 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

18 302346
ESTIMATES OF THE BUSINESS RISK PREMIUMS AND THE FINANCIAL STRUCTURE RISK PREMIUMS FOR SELECTED RAILROADS SERVING THE MIDWESTERN UNITED STATES
The Capital Asset Planning Model (CAPM) is a useful supplement to other methods for determining cost of equity capital and describes the way prices of individual securities are determined in efficient markets where there is a fault-free return plus a risk premium which is proportional to the systematic risk of a security. Eight midwestern railroads were selected for analysis with the research attempting to estimate the business as well as financial risk premiums. The application of CAPM to estimating the cost of equity capital for railroads appears no more difficult than for other industries. Financial managers can concentrate on controllable factors such as debt-to-equity rations and be aware of uncontrollable forces developing as a result of enormous capital requirements needed for rehabilitation and the effects of possible deregulation.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Belt, B (Missouri University, Kansas City)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 180-187, 4 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

18 302347
A NEW APPROACH TO RAILROAD COST ESTIMATION
Cost functions for railroads are an important element for management decision-making and a principal basis for regulatory policy. Standard ICC costing procedures are based on a number of untenable assumptions regarding allocation of common and joint costs. This paper presents the results of estimating a rail cost function using a new technique based on incorporation of engineering models of the production process into the econometric estimation process. Engineering performance models allow the inclusion of a measure of service quality, average speed of shipment, as a characteristic of the railroad's output. This is significant in allowing management to better understand the cost implication of improving service quality.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Daughety, AF Turnquist, MA Braeutigam, RR (Northwestern University, Chicago)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 188-197, 2 Fig., 1 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

18 302348
LIMITATIONS OF REGRESSION ANALYSIS IN RAILROAD COST ANALYSIS, A CASE STUDY
This paper raises some questions about the difficulty in utilizing regression analysis for cost finding in certain situations and shows how those obstacles were overcome in one case through use of a functional approach to case measurement. The study was made for the Southeastern Pennsylvania Transportation Authority (SEPTA) on maintenance costs charged to ICC Account 249, Signals and Interlockers, attributable to SEPTA commuter trains operating over Conrail and Amtrak. It was found that there are useful alternatives to statistical approaches; the method described does have its own shortcomings but did prove useful.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Jacobsen, TR (Banks (RL) and Associates, Incorporated)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 198-204, 2 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

18 302361
DEVELOPMENT OF A RAILROAD LABOR COST FUNCTION
This paper develops a labor cost function which can be used by analysis to estimate the effect of changes in operating practices on labor costs and also to assess the sensitivity of labor costs to possible changes in collectively bargained basis of pay and certain work rules, such as train crew size. Much of analysis concentrates on crews operating through freight trains as they tend to be the ones most affected by the complexities of the rules of pay. It is also applicable to crews in local freight and switching service. With modification it can be applied to passenger service.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Perritt, HH, Jr (Consolidated Rail Corporation)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 416-423

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

18 302371
TRANSPORT TECHNOLOGY: INTRODUCTION TO ECONOMICS OF TRANSPORT [Ingenieria del transporte: introduccion a la economia del transporte]
In order to establish the principles upon which the setting up of transport tariffs are based, it is necessary to state certain economic conditions of transport and to define the meaning of the term "transport" and certain other terms in relation to transport and to analyse briefly both the function and the effects of transport on the political, social and economic plan, where the transport sector leads to an increase in markets and a reduction in prices, establishing an equilibrium in the provision of articles and influencing their production and the distribution of the national revenue. A rapid analysis of the different transport modes and their operation as a service to the community has led the researchers to stress the increasingly pronounced

character of the transport sector as a public service, particularly the railways. This has led them to study the intervention of the government in this field and the related problems of competition and monopoly. On these bases, a study has been carried out of the problem of the fixing of railway tariffs, which is thought to be a question of establishing an equilibrium between supply and demand for transport. Thus an analysis of the supply (cost of production, specific charges and costs of each item) and demand in the transport service leads to the conclusion that the determination of a railway tariff may be based on the following considerations: (1) the individual tariff for each item and the general level of profits determining the value of service: equilibrium between supply-demand. (2) the general level of profits should balance with the cost of transport. (3) it is essential to know the costs of loading and transit services. (4) the basis for fixing particular tariffs and profits taken together should give the general level of profits. (5) the profits from special tariffs represent the distribution of the general level of profits between the different items. (TRRL) [Spanish]

Ramirez, M
National University of Colombia Monograph No Date, 35 p., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 106931), Central Laboratory of Bridges & Highways, France, Ministry of Public Works, Spain
ORDER FROM: National University of Colombia, Facultad de Ingenieria, Prog de Investigaciones del Transp, Bogota, Colombia

18 302706
SNCB AND INVESTMENTS IN TRANSPORT
The objectives of the study described were to make a contribution to transport in Belgium and to discuss a Belgian situation in establishing policy investment in transport by rail within the framework of the general transport policy.

IRCA/UIC (International Railway Congress Association/International Union of Railways) Congress, 22nd Session, Stockholm, Sweden, May 7-12, 1979.

De Haeck, F (Belgian National Railway Company) *Rail International* No. 4, Apr. 1979, pp 345-353

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

18 302707
INTER-RELATIONS BETWEEN THE OPERATIONAL SYSTEM OF TRAIN RUNNING, THE CAPITAL INVESTED AND ITS EFFICIENT USE
The report gives the results of research into the degree of influence of capital investments in various fields of rail transport in USSR on the system or organisation of train movement and on the main indicative coefficients of the transport process. A study has been carried out on the reciprocal relationships between the expenditure of these investments and the maximum possible volume of traffic, the indicative factors of quality of the transport process, and the daily expenditure on the transport of freight and passengers.

IRCA/UIC (International Railway Congress Association/International Union of Railways) Congress, 22nd Session, Stockholm, Sweden, May 7-12, 1979.

Kozlov, VE *Rail International* No. 4, Apr. 1979, pp 371-378

ACKNOWLEDGMENT: EI
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DOTL JC

18 302709
PLANNING OF INVESTMENT AS PART OF THE AGGREGATE LONG-TERM RAILWAY PLANNING DSB'S EXPERIENCE
The object of this paper is to describe how Danish Railroads (DSB) has attempted to solve the problems of planning and evaluation that face a 100% state owned railroad. The following two sections describe the economic and political constraints that affect DSB. Section 4 deals with the methods and evaluation techniques that are available for setting the priorities and planning the activities of a railroad. The last part of the paper describes the planning model and methods that DSB have chosen to use. The last section contains a review of a case where the decision making process for a selected problem is used to illustrate the described method.

IRCA/UIC (International Railway Congress Association/International Union of Railways) Congress, 22nd Session, Stockholm, Sweden, May 7-12, 1979.

Andersen, A (Danish State Railways); Winther, HH *Rail International* No. 4, Apr. 1979, pp 399-420

ACKNOWLEDGMENT: EI
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DOTL JC

18 302710
POSSIBILITIES FOR THE IMPROVEMENT OF THE PRODUCTION STRUCTURE OF THE GERMAN FEDERAL RAILWAY BY INVESTMENTS IN TRACK INSTALLATIONS AND VEHICLES
The author explains the planning and realization position of the more essential construction and acquisition measures of the German Federal Railway and their effects on the production structure in the passenger and goods transport. Newly constructed sections relieve the overloaded main lines in the region of critical bottlenecks, in order to be able to manage future transport recovery economically on a modern route network. New construction and modernization of a portion of the marshalling yards leads to the concentration of the train formation tasks at fewer, but more efficient installations.

IRCA/UIC (International Railway Congress Association/International Union of Railways) Congress, 22nd Session, Stockholm, Sweden, May 7-12, 1979.

Scotland, R (German Federal Railway) *Rail International* No. 4, Apr. 1979, pp 421-445

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

DOTL JC

18 302714
OPTIMAL PRICING WITH INTERMODAL COMPETITION
This analysis extends the work of William Baumol and David Bradford, on efficient pricing with a multiproduct monopoly, to include the case of intermodal competition. A set of rules is developed, showing how second best processes deviate from marginal cost when economics of scale are present. The paper shows why these rules may be difficult to implement in some cases, with a direct application to surface freight transport and then suggests a variation in the theory of second best that may be useful given those difficulties.

Braeutigam, RR *American Economic Review* Vol. 69 No. 1, Mar. 1979, pp 38-49

ORDER FROM: American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212

DOTL JC

18 302719
RAILWAY COSTING STUDY. PHASE I
At the beginning of 1977 the Canadian Transport Commission was asked to conduct a study project and to examine the present costs of the railways. A preliminary analysis was to be followed by a detailed analysis and guidelines for the future. The results of the study are to be used to calculate compensatory payments for public service obligations, to determine freight tariffs, and to plan for traffic growth, the additional equipment required, productivity and investments. The preliminary analysis contained in the report is based on a three-level general approach, i.e. appraisal of the system, identification of the problem and of areas for future research. The guidelines which efforts will be made to follow for Phase II are also set out.

Canadian Transport Commission UIC Cat. 20 N 74, Nov. 1977, 406 p., Figs., Tabs., Phots., 7 App.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Canadian Transport Commission, 275 Slater Street, Ottawa, Ontario K1A 0N9, Canada

18 303197
OPERATING COSTS AND PERFORMANCE OF AMERICAN PUBLIC TRANSIT SYSTEMS
The escalation of operating costs is threatening the existing level of transit service in the U. S. Over the last two decades, lengthening passenger trips, as a result of suburbanization and lower development densities, have been a major factor influencing increasing costs per passenger. Over the past decade, the cost of operating transit service has risen 148%. Since operating revenues have not kept pace with costs, transit subsidies have grown even

more rapidly than operating costs. Factors that have been involved in the rapid rise of operating costs are outlined. A summary is presented of approaches which could be used to help control costs.

Sale, JE (Urban Mass Transportation Administration); Green, B
American Planning Association, Journal of Vol. 45 No. 1, Jan. 1979, pp 22-27, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 303670
ECONOMICS OF A HEAVY HAUL RAILWAY
The economics of a heavy haul railway are a function of capital utilization. Analysis of components of the freight rate shows that the permanent way is the key element and locomotives and rolling stock secondary considerations. High priority is accorded to engineering and research expenditure directed to problems of the wheel/rail interface and to better utilization of various elements in the railway system.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Purcell, MS
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 104 Pap A.1, 1978, pp 1-6, 1 Fig., 2 Tab.

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

18 303675
THE KWINANA KOOLYANOBBING RAILWAY-THE CASE FOR REHABILITATION
The Perth-Kalgoorlie section of the Trans Australia Railway is nearing the end of its physical and economic life. Westrail undertook financial, economic and technical analyses to determine the mode, or modal combination, that would meet the transport demand in the most economically and technically efficient way. Not only was a rail link to heavy haulage standards shown to be the most efficient but the optimum track standard, the best time for asset replacement, the penalties for deferring investment and the financial viability of the investment for Westrail were determined from the analysis. Further, the analysis developed a case for Federal Government provision of the funds required and it is conjectured that the broad approach taken in these evaluations will become a normal requirement of commercial investment proposals to Governments.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Grimwood, PR Larke, WP
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 202 Pap B.2, 1978, pp 1-9

ORDER FROM: Institution of Engineers, Australia, 11 National Circuit, Barton, A.C.T. 2600, Australia
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18 303678
SYSTEM DESIGN CONCEPTS FOR MODERN UNIT-TRAIN OPERATIONS
Recent and current investigations into the specific costs of heavy-haul unit-train operation are revealing that cost experience on such railroads is appreciably different than that traditionally found on "conventional" railroads. To provide an economical design for a new or modified heavy-haul railroad, it is recommended that these new cost relationships be carefully considered in the design process. A systems approach is presented which enables the designer to select various combinations of design features so as to minimize the total costs of constructing and operating the railroad. Design features include such items as alignment, car size and train consist. The costs that are affected by the choice of alternative design features include initial construction and equipment costs, annual fuel cost, and annual operating and maintenance costs. The conceptual relationships between these costs and design variables are described, and recent costs from actual heavy-haul railroads are presented. An illustrative example then demonstrates the application of such cost relationships to design of a hypothetical railroad. Comparisons are made between the conclusions drawn regarding design of conventional vs. heavy-haul railroads, and the importance of such a systems design approach is demonstrated.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Pearce, JF (International Engineering Company, Incorporated)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 205 Pap B.3, 1978, pp 1-7, 11 Fig., 1 Tab., 7 Ref.

ORDER FROM: Institution of Engineers, Australia, 11 National Circuit, Barton, A.C.T. 2600, Australia
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18 303858
CAPITAL REQUIREMENTS FOR THE TRANSPORTATION OF ENERGY MATERIALS BASED ON PIES SCENARIO ESTIMATES. ANALYSIS MEMORANDUM
Capital requirements to transport coal, crude oil, petroleum products, and natural gas in the year 1985 are estimated. These requirements are based on PIES Scenarios A, C, and E which represent three alternatives for the future. The approach used to estimate requirements consists of the following three elements: formulate interregional origin-destination energy-flow matrices for crude oil, petroleum products, natural gas, and coal by using appropriate PIES scenario runs, solution files, and other relevant information; compare the above flows with data on existing facilities and networks to determine major interregional shifts and the potential need for capacity expansion in the transportation of energy on the basis of prevailing modal splits; and specify, analyze, and estimate the requirements and the capital costs of major capacity improvements and increases in transportation capacity under alternative assumptions. These estimates take into account the anticipated lead times associated with different types of projects and equipment needs. The total investment requirements for the national energy transportation system to effectively serve the nation's energy needs in 1985 are estimated to be $29.6 to $31.5 billion in lower range, and $33.6 to $35.7 billion in the upper range.

Kendrick, MJ
TERA, Incorporated AM/EI/79/19, Jan. 1979, 233 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: NTIS

18 303862
PROCEEDINGS OF THE 1978 RATE SYMPOSIUM ON PROBLEMS OF REGULATED INDUSTRIES
This volume contains the papers, discussions, and comments presented at the 1978 Rate Symposium on Problems of Regulated Industries. This was the fourth in a series of Symposia. The primary purpose of the series is to contribute to the development of practical solutions to the rate design problems. The introductory paper by M.W. Rockefeller provides background information on the status of Federal energy legislation at the time of the Symposium. This paper is followed by papers categorized into seven sections entitled: Effects of National Energy Policies on Rate levels and Rate Structures; Natural Gas Prices: Supply and Demand; Problems and Progress in Electric Utility Rate Design; Costing and Pricing Gas Services; Costing and Pricing Communications Services; Costing and Pricing Rail Transportation Services; and National Standards for Public Utility Rate Design.

From Rate Symposium on Problems on Regulated Industries, February 5, 1978, Kansas City, Missouri.

Foster, JR Jones, SB Wallace, RL
Extension Publications CONF-780277, 1978, 562 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Extension Publications, Columbia, Missouri

19 198597
PROPOSED PROJECT TO RENOVATE NASHVILLE'S HISTORIC TRAIN STATION BUILDING NEEDS TO BE REEVALUATED

The report discusses the need to reevaluate the General Services Administration's proposed project to renovate a historic train station building in Nashville, Tennessee.

General Accounting Office LCD-79-308, Apr. 1979, 35 p.

ACKNOWLEDGMENT: NTIS
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PB-295309/9ST

19 303576
THE DEVELOPMENT OF RAILWAY LAND SUBSIDY POLICY IN THE UNITED STATES

Given the desirability of developing the West as rapidly as possible, the railroad land subsidies were a well-conceived means of facilitating this process. Judiciously applied, subsidies should have been an effective method of providing the nation with needed transportation facilities, a goal realized only in part. In some cases grants were notably successful; in other cases they failed completely. In the majority of cases it appears the land grants simply hastened construction of railroads that would have been built eventually without government assistance. Grantees were given something that could be converted into an asset only by their own efforts. The government, while taking a very definite compensation for its generosity in the form of the enhanced price of the sections reserved to it and even more so in the form of rate concessions (a practice ended in 1946), assumed responsibility neither for the quality of land donated nor for the contingency that insufficient land might be available for the subsidy required for construction.

Rae, JB
Arno Press Incorporated 1979, 337 p., 1 App.

ORDER FROM: Arno Press Incorporated, 3 Park Avenue, New York, New York, 10016

DOTL HE1063.R23

20 197122
COAL TRANSPORT AND COAL MARKET INTEGRATION
The coal market is characterized by a competitive market allocation system distributing coal from fixed supply regions to fixed demand regions with geological, environmental, and transport capacity constraints. Considerable success in coal market forecasting has been recorded using linear programming models. These models have a natural extension to the evaluation of coal transport policy. Careful interpretation of the optimal solution and dual variables of an integrated coal transport and coal market model can be used to examine two specific issues: the determination of transport rates that are negotiated between parties having substantial market power, and the social costs and benefits associated with relieving potential transportation bottlenecks in coal delivery. This paper defines the appropriate linear programming model in some detail and shows how it is used to investigate these issues. /Author/

This paper appeared in TRB Research Record No. 689, Energy Efficiency of Various Transportation Modes.

Dunbar, F Mehring, JS (Charles River Associates, Incorporated) *Transportation Research Record* No. 689, 1978, pp 16-20, 1 Fig., 10 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

20 197997
AN ANALYSIS OF THE TRANSPORT OF COAL AND OIL TO THE LAKE CHAMPLAIN BASIN
The objective of this report was to prepare an analysis of the various types of oil and coal transport in the Lake Champlain Basin. The three types of transport presently in use are: (1) barges, which utilize the Hudson River, the Champlain Canal, and Lake Champlain; (2) trucks, coming from oil suppliers in the Albany, New York area, and several locations in New England; and (3) railroads, transporting petroleum products from the Albany, New York area. Economic and environmental factors such as projections relating to oil use and storage, potential oil spill concerns, distance, and capacity of carrying units were also considered.

Report on Lake Champlain Basin Study.

Heindel, C
Lake Champlain Basin Study Final Rpt. LCBS-06, May 1978, 82 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-293423/0ST

20 198130
IDENTIFICATION AND PRIORITIZATION OF CONCERNS IN COAL TRANSPORTATION NOW THROUGH 2000
This review presents the results of analysis used to identify and prioritize perceived potential problems that may hinder the development of coal transportation in the United States during the balance of the century. One objective of this effort is to discriminate serious concerns affecting the overall adequacy of coal transportation systems from issues of lesser significance. The concerns with the highest priority are anticipated to impact coal transportation in the early 1980s. These concerns relate to public acceptance, logistic problems with frozen coal, the impact of slurry pipelines, and sludge transportation. Problems with the potential of impact in the balance of the century include the effects of rate rgulations on railroad incentives to haul coal, the safety and environmental impact of advanced slurry systems and congestion on inland waterways. A second objective of the analysis is to recommend specific actions that may mitigate the consequences of potential problems. The recommendations discussed in this paper include the need for new research, developments and demonstrations, risk assessments and other evaluations to fill possible gaps in the coverage of current programs that address aspects of the above concerns. Reasons are discussed for considering some familiar issues to be of lower importance than the above concerns, including railroad capital requirements, equipment availability, abandonment policy and sabotage, eminent domain for slurry pipelines, competition for barges at harvest time and potential impacts of the Clean Air Act amendments. (ERA citation 04:021299)

Symposium on Critical Issues in Coal Transportation Systems, Washington, DC, 14 June 1978.

DeSteese, JG Franklin, AL
Battelle Memorial Institute/Pacific Northwest Labs, Department of Energy CONF-7806123-1, 1978, 16 p.

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS
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PNL-SA-6967

20 198195
STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS
The model, which is called the Future Automobile Population Stochastic Model (FAPS Model), consists of two major components: (1) Model of new car sales. The model of new car sales is the model of automobile demand developed by Wharton Econometric Forecasting Associates, revised to incorporate the new vehicle survival model that was developed. (2) A procedure for specifying future planned and unplanned events. This procedure, which specifies the future values of exogenous parameters of the model, incorporates the uncertainty of these parameters into the model. A computer program of the FAPS Model was written and is documented in the report.

Also published as Michigan University, Ann Arbor. Highway Safety Research Institute, Rept. No. UM-HSRI-78-15.

Golomb, DH Bunch, HM
Transportation Systems Center, Michigan University, Ann Arbor, National Highway Traffic Safety Administration Final Rpt. DOT/TSC/NHTSA-79-20, DOT-HS-803-656, May 1979, 110 p.

Contract DOT-TS-13729

ACKNOWLEDGMENT: NTIS
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PB-296631/5ST

20 198430
DELIVERED COSTS OF WESTERN COAL SHIPPED ON THE GREAT LAKES VERSUS EASTERN COAL FOR EASTERN GREAT LAKES HINTERLAND UTILITY PLANTS. WITH APPENDICES ON RELATIVE COST IMPACTS OF COAL SCRUBBING AND ON OTHER WESTERN COAL TRANSPORT SYSTEMS
This report analyzes the present and projected delivered cost competitiveness of Great Lakes shipped, low sulfur Western coal with low and high sulfur Eastern coal at Eastern Great Lakes hinterland utility plants. Its findings are based upon detailed data acquired from appropriate transportation firms and four eastern utility companies which use or have studied using the appropriate coal types. Two appendices provide: (1) a tentative, preliminary analysis of this competition with additional costs required by likely EPA scrubbing (sulfur removal) requirements, and (2) background information on other Western coal transport systems. Briefly, the findings of this report are that if Western coal is shipped via the Great Lakes to utility plants in the eastern Great Lakes hinterlands (i.e., inland from ports up to 200 miles): currently, based upon delivered costs only, it cannot compete with any type of Eastern coal; by 1989, with favorable interim Western versus Eastern cost escalation rate advantages on minemouth coal and transportation costs, Western coal delivered costs can begin competing with those of Eastern low sulfur, but not high sulfur coal; by 1999, with favorable relative cost escalation rate advantages, Western coal's delivered costs can become substantially less expensive than Eastern low sulfur coal's, and just begin to be competitive with Eastern high sulfur coal's; extremely high Eastern rail costs due to port area system characteristics are the main cost factor driving Western coal delivered costs to uneconomic levels. (ERA citation 04:029000)

Bertram, KM
Argonne National Laboratories, Department of Energy · Feb. 1979, 33 p.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS
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ANL/EES-TM-39

20 199008
FORECASTS OF FREIGHT SYSTEM DEMAND AND RELATED RESEARCH NEEDS
The committee identified the need to improve the forecasting of demand for freight movement as a particularly pressing issue. The workshop brought together 120 participants who represented a broad range of active interests in freight movement and forecasting. The presentations and discussions of the plenary session were organized under the following headings: (1)

Aggregate and Major Freight Category Demand Estimation; (2) Transportation Modeling and Freight Demand Trends; and (3) Corporate Planning--Major Freight Category Trends in Shipment of Manufactured and Bulk Commodities.

Proceedings of a Workshop Held at Washington, DC. on June 12-13, 1978.

National Research Council, Federal Railroad Administration DOT-RSPA/DPB/50-7920, Aug. 1979, 196 p.

Contract DOT-OS-70001

ACKNOWLEDGMENT: NTIS
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PB-298864/0ST, DOTL NTIS

20 199011
TRANSPORTATION AND THE FUTURE
The document covers technological developments in connection with urban, rural, intercity, cargo and space transportation over the next twenty to thirty years. Demographic changes will place an added emphasis on automated systems around the turn of the Century, and energy constraints may make electrically-powered systems more attractive. The passenger automobile will probably retain dominance of transportation; public tranportation systems in urban areas will evolve into more complex, multi-element operations serving both downtown and the suburbs. Energy constraints may lead to added reliance on rail and bus travel for intercity runs. Cargo vehicles will make more sophisticated use of intermodal containers. Finally, the advent of the space shuttle will completely alter the nature of orbital missions.

Paulhus, NG, Jr
Office of the Secretary of Transportation Final Rpt. DOT-I-79-1, Jan. 1979, 71 p.

ACKNOWLEDGMENT: NTIS
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PB-298907/7ST, DOTL NTIS

20 300559
SANTA FE PRODUCES FOR PRODUCE
Santa Fe has negotiated a transportation agreement with trailer-owning shippers of perishables in California and a midwestern shippers' association that is to achieve two-way loads in refrigerated vans with railroad assuring consistent ramp-to-ramp service at contract rates. With ICC's deregulation of railroads' perishables rates, Santa Fe is now looking to other marketing steps to restore its position in transport of fresh fruits and vegetables.

Progressive Railroading Vol. 22 No. 7, July 1979, pp 48-50, 3 Phot.

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

DOTL JC

20 300605
RAIL MOVEMENT DATA AVAILABILITY, TASK NO. 1
The Department of Energy's Non-Pipeline System collects data on petroleum and petroleum products shipped between Petroleum Administration for Defense Districts (PADD's) by carriers other than pipelines. Waterborne shipments are well covered in the system, but there are no rail or truck data except for PADD 5, and these data are not considered extremely reliable. This report discusses all sources of rail movement data (and incidentally truck movement data) which were found, assesses the quality of the data, and reports background information acquired in the course of the investigation. The report is the end result of an investigation into sources which might fulfill DOD's requirements for data with track petroleum products from PADD of origin to PADD of destination and provide information about amounts caried and product characteristics. The origin/destination/amount data available are those of the Interstate Commerce Commission and the Department of Transportation. No other sources were discovered despite intensive investigation.

Ideamatics, Incorporated Final Rpt. Dec. 1978, 72 p.

Contract EI-78-C-01-6434

ACKNOWLEDGMENT: Energy Research Abstracts
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TID-29447

20 300606
FREIGHT RATES MAY DISCRIMINATE AGAINST RECYCLED MATERIALS
High freight rates for recycled materials are challenged in national Association of Recycling Industries, Inc. v. Interstate Commerce Commission (ICC) on the grounds that the rates are discriminatory and a disincentive to recycling. Rail rate increases have traditionally been allowed on the basis of the need for revenue without regard for the costs in resource depletion. A U.S. District Circuit Court ruled the ICC was at fault for upholding the rates as lawful and for not complying with environmental goals of Congress. The removal of transportation barriers is necessary before recycling industries can compete in the market with virgin natural resources.

Porter, MD *Natural Resources Journal* Vol. 19 No. 1, Jan. 1979, pp 229-333

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: New Mexico University, Albuquerque, School of Law, 1117 Stanford Drive, NE, Albuquerque, New Mexico, 87131

20 300607
MOVING A NATIONAL RESOURCE. A COMPENDIUM ON INTERREGIONAL COAL TRANSPORTATION
This compendium was prepared as a four-region (V, VI, VII, and VIII) input to the National Energy Transportation Study (NETS) by the Interregional Coal Transportation (ICT) Task Force. It addresses only the aspects of coal and the transportation issues related to its movement within and across the regions. The ICT Task Force was formed in 1977 and is now represented by the Chicago, Dallas, Kansas City, and Denver regional offices of the Department of Energy (DOE). Region III, Philadelphia, has contributed as the eastern states' voice for comparative purposes. The papers' purpose is to identify the key state and regional issues which will be of consequence to the NETS endeavor. This compendium is presented in an unedited form and does not reflect official DOE policy. Specifically, the recommendations made in the Executive Summary are potential considerations as seen from a regional perspective.

Department of Energy Sept. 1978, 118 p.

ACKNOWLEDGMENT: Energy Research Abstracts
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TID-28762

20 300609
IMPACT OF TRANSPORTATION FACTORS AND AIR QUALITY LAWS ON THE MOVEMENT OF COAL TO THE MIDWEST
The principal consumer of coal in the Midwest is the electric utility industry. Two major factors that have a significant impact on the movement of coal to Midwestern utilities are transportation costs and requirements to install flue gas desulfurization systems on all electric power plants. A review of several transportation studies reveals significant variations in assumed future transportation costs. This study uses the highest and lowest of these estimates. A requirement to install gas desulfurization systems on all power plants may enhance the development of new systems that are less costly than the lime/limestone system if low-sulfur coal is utilized. Costs of limestone and ammonia absorption flue gas desulfurization systems are compared for various levels of sulfur in coal. Using the Argonne Coal Market Model, eight scenarios that incorporate different assumptions about the level of transportation rates and sulfur emission requirements were analyzed. It was concluded that shipments of Western coal to the Midwest will be most affected by the regulations adopted regarding flue gas desulfurization. High transportation costs, while important, will not be decisive. If stringent desulfurization is mandated, then the potential Midwestern market for Western coal will be seriously eroded. On the other hand, if more moderate desulfurization levels like those proposed by the Department of Energy are accepted then the relative share of Western coal in the Midwestern market will increase.

Treat, N Allen, E
Oak Ridge Associated Universities, Incorporated Tech Rpt. ORAU-/IEA-79-4 R, Feb. 1979, 116 p.

Contract EY-76-C-05-0033

ACKNOWLEDGMENT: Energy Research Abstracts, NTIS
ORDER FROM: NTIS

ORAU/IEA-79-4(R)

20 300610
COAL MINING
The panel on coal mining technology of the NRC committee on processing and utilization of fossil fuels was appointed to assess the distribution and quality of the nation's coal reserve, underground and surface mining techniques, processing techniques, manpower and transportation requirements, the environmental impact of coal mining, and other social and regulatory issues. The worsening energy shortage and the recent decline in coal mining productivity stimulated the panel to consider all factors influencing coal mining activities so that it could make recommendations for improving the environmental acceptability of coal mining and the health and safety of miners while also increasing productivity and improving the economics of coal mining. Nine conclusions are outlined and eight recommendations are presented.

National Academy of Sciences 1978, 100 p.

Contract EX-76-C-01-1216

ACKNOWLEDGMENT: Energy Research Abstracts
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20 300611
NICKEL
Nickel is vital to the $50 billion iron and steel industry; moreover, it has played a key role in the development of the current $36 billion aerospace industry. Without nickel, the sophisticated industrial complexes that provide our high standard of living and superior military armament would not be possible. Nickel's greatest value is in alloys with other elements, where it adds strength and corrosion resistance over a wide range of temperatures. This Bureau of Mines report presents comprehensive data on nickel including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors and problems, operating factors and problems, toxicity, and outlook to 2000.

Matthews, NA
Bureau of Mines 1979, 19 p., 3 Fig.

ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 300612
MOLYBDENUM
Molybdenum is a refractory metallic element used principally as an alloying agent in steels, cast irons, and superalloys to enhance hardenability strength, toughness, and wear and corrosion resistance. Primarily added in the form of molybdic oxide or ferromolybdenum, it is frequently used in combination with chromium, columbium, manganese, nickel, tungsten, or other alloy metals to achieve desired metallurgical properties. This Bureau of Mines report presents comprehensive data on molybdenum including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors and problems, operating factors and problems, and outlook to 2000.

Kummer, JT
Bureau of Mines 1979, 23 p., 2 Fig.

ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 300613
MINERALS IN THE U.S. ECONOMY: TEN-YEAR SUPPLY-DEMAND PROFILES FOR NONFUEL MINERAL COMMODITIES 1968-77
The accompanying supply-demand diagrams and 10-year tables for nonfuel mineral commodities present essential data required by government, industry, and others to formulate policies and programs that can help assure an adequate and continuing supply of mineral raw materials. The 10-year data base terminates with 1977 figures because adequate world information was not available beyond that date. The selected mineral supply-demand tables and flow diagrams comprise but one "output" from the massive body of information and data collected by the Bureau of Mines on a continuing basis covering mineral production, consumption, prices, shipments, imports, exports, and stocks, as well as industry activities in all States and abroad.

Bureau of Mines 1979, 97 p., 91 Fig.

ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 300636
NATIONAL COAL MODEL: COAL SUPPLY CURVES
The computerized National Coal Model (NCM) is designed to project future levels of United States coal production, consumption, and prices and to permit the analysis of the impact of coal-related public-policy issues on such factors. The NCM integrates four major functional components, or modules: Coal supply; electric utility coal demand; non-electric utility coal demand; and coal transportation. The model has a high degree of resolution and includes 30 supply regions, 35 demand regions, 40 possible coal types, and six consuming sectors. This report describes the coal supply component of the NCM and presents the detailed coal supply curves which are its primary output.

Detailed documentation of the NCM is available from NTIS as PB-263334.

Department of Energy DOE/EIA-0103/2, Sept. 1978, 218 p.

ACKNOWLEDGMENT: Energy Research Abstracts, NTIS
ORDER FROM: NTIS
DOE/EIA-0103/2

20 300637
BITUMINOUS COAL AND LIGNITE DISTRIBUTION
During January--September 1978, production of bituminous coal and lignite in the United States totaled 456 million tons; 448 million tons were shipped for consumption while 8 million tons were stockpiled. Of the total coal distributed in the first nine months of 1978 (Table I), 422.6 million tons (94 percent) were delivered to consumers in the United States and 25.7 million tons (6 percent) were exported (9.1 million tons to Canada and 16.6 million tons to Mexico and destinations overseas). A summary of coal shipments by district of origin are summarized. Shipments by geographic division destinations are shown in tables. Of the 423 million tons of coal distributed for consumption in the United States, 305 million tons (72 percent) were delivered to four areas as follows: East North Central, 133 million tons; South Atlantic, 70 million tons; East South Central, 52 million tons; and West North Central, 50 million tons. Railroads, the principal mode of coal transportation, hauled 227 million tons of coal, more than half of the total coal shipped during this period.

Department of Energy DOE/EIA-0125/3(78), Jan. 1979, 77 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: NTIS
DOE/EIA-0125/3(78)

20 300638
LEGAL, LEGISLATIVE, AND INSTITUTIONAL OBSTACLES TO THE DEVELOPMENT OF CONSISTENT-NATIONAL ENERGY AND TRANSPORTATION POLICIES
Links between energy and transportation policies to encourage domestic energy development, energy conservation, and environmental protection will require some tradeoffs to develop a coherent national policy that works. In order to remove impediments to consistent policies, the author recommends: (1) rational application, using incentives, of environmental restraints in non-attainment regions until the best-available control technologies for burning coal are available; (2) rate regulations that will permit railroads to recover adequate rates of return for the transportation of coal and other commodities; (3) permission for railroads to compete for coal traffic on the same basis as other modes; (4) permission for coal-slurry pipelines to operate where rail service is not available and protection to railroads losing volume to slurry pipelines; (5) eliminate unnecessary regulation, after careful review, of cooperative and joint ventures; and (6) create an energy tax trust fund to alleviate coal hopper car shortages and other transportation-energy-related purposes.

Francesa, AJ (United States Railway Association) *Natural Resources Lawyer* Vol. 11 No. 3, 1979, pp 569-613

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: American Bar Association, 1155 East 60th Street, Chicago, Illinois, 60637

20 300639
SUPPLY-DEMAND FORECAST THRU THE YEAR 2000
The initial approach in this study which predicts U.S. coal supply and demand through the year 2000 was to analyze the coal-mining industry and to project the short-term (1985) coal supply based on existing and proposed mine openings, incorporating new mine life, known long-term coal contracts

and recoverable resource at the various mines. From this capacity analysis, the energy demand by use sector was then analyzed and the total projection made through the year 2000. Based on this type of analysis, U.S. eastern coal production will increase at an average rate of 2.6%/yr, while western coal growth rate is approximately 22%/yr and, by the year 2000, grows to furnish very close to one-half of the total supply, if Federal leasing resumes in 1980.

Lockwood, DL (Cameron Engineering) *Coal Mining and Processing* Vol. 15 No. 8, Aug. 1978, p 55

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: ESL

20 300640
COAL IN TRANSITION: 1980--2000
Headquartered at Stanford University, the Energy Modeling Forum operates through a series of working groups of energy model developers and users to make comparative tests of a variety of energy models. The second group, under the direction of David Sternlight, chief economist at the Atlantic Richfield Company, examined ten models used to analyze the level and composition of coal production during the period 1980 to 2000. Results from the study show that all the models indicate a dramatic shift in the proportion of total U.S. coal production in the West under a variety of alternative assumptions about regional economics and environmental standards.

Stanford University Final Rpt. EPRI-EA--967, Feb. 1979, 46 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Stanford University, Electric Power Research Institute, Palo Alto, California

20 300642
ANALYSIS OF TRANSPORTATION ALTERNATIVE FOR MEETING TEXAS' INDUSTRIAL DEMAND FOR WESTERN COAL THROUGH THE YEAR 2000. PUBLIC INFORMATION REPORT NO. 4
An analysis of Texas' industrial energy demands and fuel supplies through the year 2000 is developed for differing assumptions, with particular emphasis on the use and supply of western coal. Existing and potential future transportation facilities for the movement of coal and coal-derived energy between the coal fields of Wyoming and Montana and Texas' demand centers are examined. The technical, economic, environmental, and institutional factors affecting unit trains, slurry pipelines, barges and mine-mouth conversion of coal to electricity and to synthetic gases and liquids are discussed with primary attention directed at unit trains and slurry pipelines. Given the projected demands for western coal, a mathematical network model is utilized to determine the adequacy of existing transportation facilities and the cost of providing additional facilities to meet the projected demands. The results indicate that with moderate investment in railroad maintenance and expansion and continuance of current noncoal rail traffic volumes, adequate rail capacity is available within Texas to handle the projected coal demands through the year 2000. The capacity of the rail network connecting western coal fields with Texas may be a constraint to future coal transportation. The transportation cost using unit trains will be approximately 30 percent greater than if slurry pipelines are utilized although adequate capacity appears to exist to handle the coal demands. From consideration of direct transportation costs and certain subjective criteria, construction of two or three large-capacity slurry pipelines into the Houston area would result in providing the projected coal demands to the state at the minimum total cost.

White, DM
Texas University, Austin UT/CES-PR-4, Mar. 1978, 136 p.

ACKNOWLEDGMENT: Energy Research Abstracts
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20 300643
MINING AND UTILIZATION OF WESTERN COAL
The mining and utilization of western coal is necessary to fuel a new generation of power stations. As many as 250 new power stations, which will be coal-fueled, are being constructed to provide electrical power for areas previously served by oil and natural gas fueled units. These new power stations, in the western, midwestern, and southern states, have contracted to burn a large portion of the western coal to be mined. The dependency upon coal to meet the current rate of growth in energy demand and to reduce the need to import excessive amounts of oil and natural gas is evident. Mining methods and transportation systems exist or are being developed to handle the massive amounts of western coal that will be required. Correspondingly large amounts of fly ash will be produced of a composition and in locations favorable to its utilization as a source of primary metals and useful by-products.

Murtha, MJ
Iowa State University, Ames, Department of Energy IS-4616, Feb. 1979, 40 p.

Contract W-7405-ENG-82

ACKNOWLEDGMENT: Energy Research Abstracts, NTIS
ORDER FROM: NTIS

IS-4616

20 301062
PROJECTING THE DEMAND FOR OHIO RIVER BASIN WATERWAY TRAFFIC BY CORRELATION AND REGRESSION
The techniques used in projecting future commodity movements on the waterways of the Ohio River Basin and the manner in which these projections were assigned to the navigation projects in the region are presented. Historical data on commodity movements were collected and computer coded. Economic factors and associated projections that have some possible relation to commodity movements were selected, and a set of projected values was obtained for each commodity group by use of simple and multiple regression techniques. Recent trends in port-to-port commodity movements in conjunction with commodity group projections were then used to construct future origin-destination matrices for each commodity group. Finally, by using a traffic assignment program originally developed for urban transportation system modeling, a set of direction-specific and commodity-group-specific tonnages was assigned to each navigation project in the Ohio River Basin. /Author/

This paper appeared in TRB Research Rocord No. 704, Inland Waterway User Charges, Port Development, and Research Methodologies.

Matzzie, DE Feldsott, SI (CONSAD Research Corporation); Keeney, R Everman, JS (Army Corps of Engineers) *Transportation Research Record* No. 704, 1979, pp 1-6, 2 Fig., 2 Tab., 7 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

20 301064
TIME-BASED MULTICRITERIA EVALUATION MODEL OF USER CHARGES
The results of a study conducted to develop a model of waterway user charge impacts and test the model on a case study region are summarized. The model developed is a Markov decision theory model with an implied transition period of five years. The transition probabilities were estimated subjectively based on a state space defined by change in freight traffic movement. Reward estimates were based on multiple criteria such as change in shipping costs and change in equity. The rewards were developed from a variation on the rank-based expected-value method of evaluation. These were also produced subjectively based on the results of previous studies. The input on the upper Mississippi River case study site was processed by a Markov decision theory computer program. Considerable sensitivity analysis on rewards and transition probabilities was done. In the majority of cases, the alternative of no user charge was favored. In certain periods of high growth in freight traffic, a low-level fuel tax was favored. The case study results themselves are not as significant as the problem structuring that was accomplished and the introduction of time and nonmonetary criteria into the evaluation process. /Author/

This paper appeared in TRB Research Record No. 704, Inland Waterway User Charges, Port Development, and Research Methodologies.

Meyer, RW (National Marine Service, Incorporated) *Transportation Research Record* No. 704, 1979, pp 14-20, 2 Fig., 17 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

20 301067
WATERWAY USER CHARGES: SOME LIKELY IMPACTS IN THE TENNESSEE AREA
Research whose purpose was to assess potential waterway user charges and their impacts and to provide the basis for the establishment of a state position is reported. The research was intended to serve the function of an informational report and not to provide hard recommendations either for or

against a user charge. Most of the information was gathered through secondary sources published by water carrier associations and various federal agencies. Data were also collected, by means of survey and sampling techniques, from such primary sources as waterway carriers and industrial shippers. An analysis of the financial profile of the towing industry suggests that any user charge levied on towing firms will ultimately be passed on to the consumer. Smaller firms will probably suffer most since they operate with smaller margins and high turnover. Reduction in overall industry market share of national commodity transports will remove some of the economies associated with large-volume movements and eventually affect the profitability of larger towing firms. A segment toll represents the greater impact in terms of towing industry operating costs, shipping rates, state waterway traffic volume, employment, and electrical consumer utility costs. A $0.01/L ($0.04/gal) fuel tax represents the smallest impact. In light of the lack of complete empirical evidence, any cost-recovery scheme should be phased in on a gradual basis so as to allow for a cautious monitoring of both positive and negative impacts. /Author/

This paper appeared in TRB Research Record No. 704, Inland Waterway User Charges, Port Development, and Research Methodologies.

Burns, KJ Mickle, GD (Memphis State University) *Transportation Research Record* No. 704, 1979, pp 32-39, 2 Tab., 5 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

20 301164
STUDY TO REPRESENT MARKET REQUIREMENTS AS REGARDS PART-LOAD TRAFFIC AND THE CHOICE OF LOAD UNITS [Projektstudie fuer die Darstellung der Marktforderungen an den Stueckgutverkehr und Auswahl der Ladeeinheiten]
Pilot study to forecast the volume of freight that could be handled using containers in 1990 in Federal Germany for distances greater than 300 km in the first stage. Problem of load units: containers and pallets, transport means, transhipment centres. Examination of the weak points seen in combined transport: standing time in terminals, investments necessary for adapting vehicles, transmission of information. [German]

Bock, FW *Internationales Verkehrswesen* Vol. 31 No. 1, Jan. 1979, pp 5-7

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

20 301710
INTERMODAL COMPETITION IN THE FREIGHT LAND TRANSPORT MARKET [La concurrence intermodale dans le marche des transports terrestres de marchandises]
After giving figures on the growth in traffic and its distribution in the last ten years, the writer attempts to determine the underlying causes of the present situation, and draws a lesson from these for a better adaptation of joint freight transport policy. [French]

Ventrella, F *Transports* No. 242, No Date, pp 155-165, 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Editions Techniques et Economiques, 3, rue Soufflot, 75005 Paris, France

DOTL JC

20 302132
COAL RESOURCES AND DEVELOPMENT MAP OF COLORADO
The detailed map shows locations of lignite with less than 150 feet of overburden and with 150 to 1,000 feet of overburden; subbituminous or bituminous coal with less than 150 feet of overburden and with 150 to 3,000 feet of overburden; bituminous coal with more than 3,000 feet of overburden; anthracite and semianthracite; and areas of past or present coking-coal production. The coal-bearing regions are identified with their estimated original in-place resources to 6,000 feet and estimated remaining in-place resources to 6,000 feet as of January 1977. Additional information indicated on the map includes underground and underground abandoned mines; surface and abandoned surface mines; proposed underground and surface mines; coal mines emitting measurable amounts of methane; coking and coal washing plants; proposed coal gasification plants (surface); proposed in-situ coal gasification projects; proposed methane recovery project; coal-fired electric generating plants; coal-bearing formations; railroads and proposed routes; route of travel of coal unit trains and freight trains that haul coal; coal slurry pipelines (proposed); known coal resource leasing areas.

Jones, DC Schultz, JE Murray, DK
Geological Survey 1978, v.p.

ORDER FROM: Geological Survey, Denver, Colorado

20 302133
WESTERN COAL: PROBLEMS, PROGRESS, AND PROMISES. SUMMARY REPORT
The Engineering Foundation conference on Western Coal: Problems, Progress, and Promises, focused attention on the significant issues affecting the development and usage of the region's vast reserves of coal. It appeared that the main issues centered around the lack of a National energy policy, the problems associated with the Federal coal leasing program, and the regulations promulgated by the Office of Surface Mining. The transportation of western coal was the subject of a lively session involving the railroad interests on one side and the interests of pipeline enthusiasts on the other. Technical issues were not neglected but were given coverage in the following areas: emerging mining technologies, preparation, utilization options, combustion research, and particulate/SOx emissions at the power station.

From Western coal-problems, progress, and promises; Keystone, Colorado, September 10, 1978.

Colorado School of Mines CONF-7809140, 1978, 63 p.

Contract EW-78-A-02-4780

ORDER FROM: Colorado School of Mines, Research Institute, Golden, Colorado, 80401

20 302152
WESTERN COAL TRANSPORT ALTERNATIVES: SOME COMMENTS ON UNIT TRAINS AND SLURRY PIPELINES
Transport cost is a significant factor in the development of western coal resources, which are located long distances from the consumer. Railroads currently are the dominant carriers of western coal, but slurry pipelines have been proposed as an alternative transport mode. A recently completed study sponsored by the Bureau of Mines and the Department of Energy suggests that slurry pipelines must move large coal tonnages and have large mines and consumers located near the line to be cost competitive with existing railroads. In addition to comparative costs, environmental impacts of each transport mode, particularly those impacts resulting from slurry water needs and high rail traffic, play a large role in the competition between railroads and slurry pipelines for transporting western coal.

Proceedings of the Council on Economics AIME 107th Annual Meeting, Denver, Colorado, February 26-March 2, 1978.

Balazik, RF (Bureau of Mines)
American Inst of Mining, Metallurg & Petrol Engrs 1978, pp 47-52, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

20 302156
THE UNIT TRAIN AND THE DEVELOPMENT OF LOW SULFUR COAL RESOURCES IN THE WESTERN INTERIOR REGION
The ten-fold increase in coal production in Western states in less than two decades has been marked by unit-train haulage within and to points outside the states that mine the coal. The present and future patterns of development, both for mining and transportation, are discussed. A table details unit train operations. Estimates of future operations of such trains depend on coal demand, resource selection options, environmental protection constraints, and alternative transportation methods.

Warren, WD (Sangamon State University) *Transportation Journal* Vol. 18 No. 4, 1979, pp 53-63, 2 Fig., 2 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

20 302332
DERIVED DEMAND FOR FREIGHT TRANSPORT AND INTERMODAL COMPETITION IN CANADA
This study reveals significant competition in varying degrees between rail, road and waterway freight transport, and finds that shippers take time to respond to changes in freight rates.

Oum, TH *Journal of Transport Economics and Policy* Vol. 13 No. 2, May 1979, pp 149-168, 5 Tab., 32 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England
DOTL JC

20 302339
MACRO-ECONOMETRIC FORECASTING OF CANADIAN PACIFIC RAIL FREIGHT SHIPMENTS AND REVENUES
This paper discusses Canadian Pacific's rationale for undertaking a project aimed at forecasting rail freight traffic and revenues on the basis of macroeconomic indicators. The theoretical frameworks in which model specification and estimation will operate are outlined. The underlying research strategy for the project is discussed. Based on work carried out, examples of empirical results are presented. The course of future work is indicated.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Darby, PM Schulman, JF (Canadian Pacific Limited)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 17-24, 3 Tab., 9 Ref.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

20 302377
DERIVED DEMAND FOR FREIGHT TRANSPORT AND INTER-MODAL COMPETITION IN CANADA
Demands for railway, highway and waterway modes are derived from production and distribution technology and estimated from time-series data of Canadian intercity freight transport, 1945-75. These are, in turn, used to measure price elasticities of demand. Both own-price elasticities and possibilities of competition between modes have increased steadily over time. Highway modes essentially complemented railway services until the late 1950s, and thereafter became increasingly competitive. Shippers are found to respond to price changes with systematic lag, with mean of eight months and variance of thirteen months.(a) (TRRL)

Taeledge, DJ (Queen's University, Canada) *Journal of Transport Economics and Policy* Vol. 13 No. 2, May 1979, pp 149-168, 5 Tab., 32 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241691)
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England
DOTL JC

20 302695
A CROSS SECTIONAL STUDY OF FREIGHT TRANSPORT DEMAND AND RAIL-TRUCK COMPETITION IN CANADA
This article derives a rail-track freight demand model that is consistent with the economic theory of modal choice in the price-speed-reliability space. The translog model is estimated from the cross sectional data of Canadian interregional freight flows for the eight selected commodities. Major empirical findings are: (i) The quality attributes of service significantly influence modal choice only for the relatively high-value commodities. (ii) Both the price and quality elasticities of demand and the elasticity of rail-truck substitution vary substantially from route to route as well as from commodity to commodity. This implies that CES models including Cobb-Douglas form should not be used for freight demand studies. (iii) For the relatively high-value commodities, short-haul traffic is largely dominated by the truck mode, and significant rail-truck competition exists only in the medium and long-haul markets. (iv) For the relatively low-value commodities, effective rail-truck competition exists only in the short-haul markets. Hence, the medium and long-haul markets are largely rail-dominated.

Oum, TH (Queen's University, Canada) *Bell Journal of Economics* Vol. 10 No. 2, 1979, pp 463-482, 4 Tab., Refs.

ORDER FROM: ESL
DOTL JC

20 302717
THE FUTURE OF THE TRUCK AND RAIL MODES AS CARRIERS OF FREIGHT IN CANADA
The freight transportation system has changed dramatically during the past three decades. Analysis of the industry has shown that the two main factors contributing to this change have been changes in retail industry output and productivity changes in the truck and rail modes. These results suggest that forecast of the future of the freight system must be based on sound forecasts of regional industrial output, energy supply and pricing policies, labour supply and wage rates and technological changes in the individual modes. This paper outlines a systematic procedure for incorporating these factors in a forecast of the freight system to the year 2000. The general economic, energy and labour assumptions are combined in a macroeconomic forecast of the Canadian economy. This forecast is disaggregated with the twenty sector input-output model and regionalized with forecasted regional share coefficients. Productivity profiles for each mode are derived from projected technological and operational improvements. These results are combined with a modal split model to generate projected freight movements for each mode. These modes are described in quantitative and qualitative terms to develop modal profiles for the forecast period. Different sets of input assumptions are used to develop three unique scenarios about the freight system and its component parts. The results of this analysis are used to identify critical areas of concern in the freight transportation system over the next two decades.

Kuczer, C Wolff, RN
Toronto-York University Joint Program in Transp Aug. 1979, 300 p.

ORDER FROM: Toronto-York University Joint Program in Transp, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario M3J 1P3, Canada

20 303593
BRITISH INDUSTRY TODAY. FREIGHT TRANSPORT. THIRD EDITION
A review of developments in freight transport in Great Britain over the past ten years indicates that the demand for such transport has varied according to the level of Britain's economic activity and, for shipping and civil aviation, according to that of the world's major trading nations. Data are presented which show that in 1976, in terms of tonne-kilometres, 67 per cent of inland freight travelled by road, 16 per cent by rail, 14 per cent by coastal shipping and 3 per cent by pipeline and inland waterway. This pamphlet gives a brief account of the growth of freight transport in Britain, from 1564 million tonnes in 1961 to 1781 million tonnes in 1976, outlines the structure of the freight transport industries and indicates the government's policy on inland freight transport. Separate sections describe the activities of each mode of freight transport: road haulage, railways, shipping, ports, inland waterways, pipelines and air freight. Although much of the description is applicable to Northern Ireland, special reference is made to the position there where it calls for separate treatment.

Her Majesty's Stationery Office Pamphlet No. 101, 1978, 35 p., 9 Tab., 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 243105)
ORDER FROM: Her Majesty's Stationery Office, Central Office of Info, Reference Div, 49 High Holborn, London, England
P7903013

20 303624
COMBINED TRANSPORT TRENDS [Tendenzen des Kombinierten Verkehrs]
Combined transport has allowed rail freight traffic to be increased by both competing (container traffic) and cooperating (piggyback) with heavy road transport. Combined transport is being promoted by governments on both a national and international scale. Economic circumstances specific to the DB, and transport policy, are such that this form of transport may no longer be disregarded, which should enable satisfactory solutions to be found to the overall problem of transport. [German]

Strobel, M *Die Bundesbahn* Vol. 55 No. 7, July 1979, n.p., 4 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

20 303663
COAL-OIL MIXTURE: TRANSPORTATION FACTORS
Coal transportation costs are significant portions of the prices paid by users and necessarily are a contributing factor in determining optimum plant sizes and locations of COM mixing facilities and the market areas to be supplied by each facility. Residual fuel oil, on the other hand, is available at refineries located in nearly all regions of this country. An exception to this is the East Coast, where much of its residual fuel oil is imported from offshore refineries.

Because of the different supply patterns of coal and fuel oil, coal apparently will have to be moved longer distances to some of the prospective COM mixing facilities than will the oil. Costs for shipping the coal vary because of mode of haul and of distances and quantities hauled. For example, rates per ton vary from about $2 to more than $5 per ton between single-car and unit-train shipments. The spread between these rates tends to increase as the distances hauled increase. Because of this, costs encountered by mixing plants that can cope with large coal deliveries will be significantly lower than for those that must receive the coal in small lots of one or a few cars at a time. Further study of these matters, along with other technological and marketing factors, is needed in order to determine the optimum plant size and the market to be served. While certain general rules can be stated, each proposed plant requires specific study and analysis because of differences in both its sources of coal and residual fuel oil and the market that will consume the COM as it is processed and delivered.

Campbell, TC
Department of Energy FE/EES-79/3, Jan. 1979, 14 p.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: NTIS

20 303854
DESIGN FOR A TECHNOLOGY ASSESSMENT OF COAL
The objective of the coal technology assessment is to compare the environmental, social, economic, and institutional consequences that may arise from development of various mixes of coal-based energy technologies to the year 2030. This article presents the assumptions behind the method, the experience from two forums with interested parties, the three scenarios constructed for the study, and the result of one issue analysis, namely the effects of global carbon-dioxide buildup from coal combustion.

Kawamura, K *Geoexploration* Vol. 11 No. 4, Aug. 1979, pp 299-311

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL

DOTL JC

20 303869
THE FUTURE IS INTERMODAL
A 36-page supplement outlines the history of American piggyback and discusses various facets of the current situation including the problems and potential. The articles: A Brief and Eloquent Past; the New Ballgame; Growth Through Improving Productivity; The Uncommon Box; Interway Is Intermodal.

Modern Railroads/Rail Transit Vol. 34 No. 11, Nov. 1979, pp 55-90, Phots.

ORDER FROM: ESL

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20 304079
REGIONAL REFERENCE ENERGY SYSTEMS: ELECTRIC UTILITY APPLICATIONS
Reference Energy Systems (RES) were developed for the region serviced by the Tennessee Valley Authority (TVA) for the base year 1975 and projections developed for the years 1980, 1985, and 2000. This system's formulation has traditionally been applied to assessment of energy technologies and policies on a national level. A reformulation of the projection methodology is presented in order to apply the RES format to an electric utility region (e.g., the TVA). The RES is a network representation of technical activities required to supply various forms of energy to end-use activities. Technologies are defined for all operations involving specific fuels including resource extraction, refinement, conversion, transportation, distribution, and utilization. Each of these activities is represented by a link in the network for a given year with the levels of energy demand and supply specified. A unique advantage of using the RES for utility planning is its integrative view of the entire energy system as opposed to an analysis limited exclusively to the electric sector. This system's approach, incorporating all resources, technologies and uses of energy, allows a utility to assess the impact of alternate technologies and policies across the entire energy system. Demand patterns for 25 end-use demand categories within the residential, commercial, industrial, and transportation sectors are developed for a base-case scenario representing reasonable energy-use patterns derived in a consistent manner by applying engineering techniques to the best available information. The impact of a new technology in terms of resource consumption may be evaluated by modifying the energy-flow paths to incorporate the new technology. Alternate paths through the network reflect the substitutability of resources and technologies for one another. (ERA citation 04:043234)

Hermelee, A
National Center for Analysis of Energy Systems, Department of Energy Jan. 1979, 106 p.

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

BNL-50962

20 304094
SHORT TERM COAL DEMAND MODEL, FINAL REPORT
This report summarizes the development of a short term model, the primary purpose of which is to predict bituminous coal and lignite consumption patterns, preferably at the State level of detail, under alternative policy scenarios. The model components described are all econometrically based. Alternative methodologies requiring additional research are presented in the final chapter. The development of a coal demand model was based upon perceptions of the unique characteristics of the various demand sectors. Historically, coal demand has been differentiated into four major components: a) coking coal demand; b) retail, manufacturing and other industrial coal demand; c) coal demand by electric utilities; and d) export demand for coal. Due to the marked differences in these four sectors, the variables they depend on, and the quantity and quality of available data, each sector was modelled separately. The demand for coal in the electric utility sector is dependent upon two major factors: electricity production and inventory levels. Chapter III details the methodology developed to forecast electricity generation by state. This variable is integrated with forecasts of inventory level to forecast coal consumption in the utility sector. Additional research recommendations suggested are based upon the availability of additional data resources, the experience and insights gained from the analyses and recognition of the dynamic nature of coal consumption patterns in the United States. (ERA citation 04:038127)

Young (Arthur) and Company, Department of Energy Apr. 1977, 42 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DOE/TIC-10089

20 304100
ROCKY MOUNTAIN COAL FOR SOUTHERN CALIFORNIA'S COAL-FIRED ELECTRIC POWER GENERATION
This report is a scaled-down version of a Study of Alternative Locations of Coal-Fired Electrical Generating Plants to Supply Western Coal to the Department of Water Resources. It covers three aspects of the major report: (1) coal resources in the Upper Colorado Plateau, (2) the possible transportation of those coal resources to southern California, and (3) the cost analyses of the coal transportation. Descriptions of 92 coalfields within an 800-mile radius of the Los Angeles energy market are included. The general legal regulations governing the acquisition and development of coal from state, federal, and private lands are discussed. This report also describes the existing and potential methods of transporting the coal to southern California. (ERA citation 04:038128)

Anderson, OL
Los Alamos Scientific Laboratory, Department of Energy Feb. 1979, 45 p.

Contract W-7405-ENG-36

ACKNOWLEDGMENT: NTIS
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LA-6915-MS

20 304190
WASHINGTON STATE AGRICULTURAL EXPORT DIRECTORY
The directory is designed to be a convenient working tool that will enable potential buyers, both domestic and foreign, to survey quickly the sources of the wide range of agricultural products available in the state of Washington.

Sponsored in part by Agricultural Marketing Service, Washington, DC.

Cargol, OF
Washington State Department of Agriculture, Agricultural Marketing Service 1978, 118 p.

ACKNOWLEDGMENT: NTIS

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PB-297684/3ST

20 304228
INTERREGIONAL ADVANTAGES IN BROILER PRODUCTION: THE POTENTIAL IMPACTS OF NAVIGATION USER CHARGES
The objective was to determine what effect the imposition of navigation user charges would have on geographical location of the broiler industry. A transportation model was developed which incorporated the basic production, consumption, and cost characteristics of the broiler industry. Eight production areas were chosen. Budgets including the costs of assembling, producing, processing, and transporting broilers were formulated for each production area. The model was then evaluated under different production and cost specifications.

Spilka, WJ Kenyon, D Shabman, L
Virginia Polytechnic Institute & State University, Office of Water Research and Technology, (OWRT-B-082-VA) BULL-145, OWRT-B-082-VA(3), Nov. 1978, 44 p.

ACKNOWLEDGMENT: NTIS
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PB-298044/9ST

20 304231
ENERGY FROM THE WEST: POLICY ANALYSIS REPORT
The study examines the development of six energy resources (coal, geothermal, natural gas, oil, oil shale, and uranium) in eight western states (Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming) during the period from the present to the year 2000. Nine major problem and issue categories are analyzed: water quality, water availability, air quality, land use and reclamation housing, growth management, capital availability, transportation, and energy facility siting. The final chapter discusses policy responses available to policy makers at various levels of government, in Indian Trades, and in the private sector.

White, IL Chartock, MA Leonard, RL Ballard, SC Calzonetti, FJ
Oklahoma University, Environmental Protection Agency Final Rpt. EPA/600/7-79/083, Mar. 1979, 857 p.

Contract EPA-68-01-1916

ACKNOWLEDGMENT: NTIS
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PB-298074/6ST

20 304417
FUEL USE ACT. FINAL ENVIRONMENTAL IMPACT STATEMENT
The major environmental impacts and adverse effects discussed in this environmental impact statement (EIS) are those which would result from implementation of the regulations for enacting the coal and alternate fuels use program which has been authorized by the Powerplant and Industrial Fuel Use Act of 1978 (FUA) Pub. L. 95-620. This impact statement deals with overall program and regional impacts rather than site-specific impacts and is predicated on the assumption that coal will be the primary fuel substituted for oil and natural gas in the short term (until 1990). Site-specific environmental impacts will be addressed in subsequent NEPA compliance documents, for exemption petitions and by other federal, state, and local permitting agencies. (ERA citation 04:044913)
Microfiche copies only.

Department of Energy Apr. 1979, 589 p.

ACKNOWLEDGMENT: NTIS
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DOE/EIS-0038

20 304561
MID-AMERICA PORTS STUDY EXECUTIVE REPORT: MID-AMERICA'S PORTS
The document is a briefing report on the major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf Intercoastal waterways. The document contains in summary form the findings of the main report, Volume I.

Tippetts-Abbett-McCarthy-Stratton, Temple, Barker and Sloane, Incorporated, Chase Econometric Associates, Incorporated, Institute of Public Administration, Maritime Administration MA-PORT-970-79074, June 1979, 24 p.

Contract MA-7-38006
ACKNOWLEDGMENT: NTIS
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PB-299561/1ST

20 304562
MID-AMERICA PORTS STUDY, VOLUME 1. MAIN REPORT
The document reports on a study funded jointly by 17 states and the Maritime Administration. Its objective was to: (1) determine historic commodity flow data and project (forecast) trends and quantities to the year 2000, (2) inventory working cargo facilities, (3) estimate current cargo handling capacities, (4) project the handling capacity requirements to service forecast commodity growth to the year 2000, (5) estimate land and capital requirements to install required capacity to the year 2000, (6) estimate possible constraints, and their magnitude, of locks, the user charge, etc., (7) recommend institutional requirements for development.

Tippetts-Abbett-McCarthy-Stratton, Temple, Barker and Sloane, Incorporated, Chase Econometric Associates, Incorporated, Institute of Public Administration, Maritime Administration Final Rpt. MA-PORT-970-79075, June 1979, 360 p.

Contract MA-7-38006

ACKNOWLEDGMENT: NTIS
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PB-299562/9ST

20 304563
MID-AMERICA PORTS STUDY. VOLUME 2. GENERAL APPENDIXES
The document contains the general appendix material to Volume I, Main Report, namely: Appendix A-Commodity Group Analysis (TBS); Appendix B-Port Facilities Inventory Forms (MarAd); Appendix C-Inland Waterway Fleet Technology (TBS); Appendix D-Econometric Forecasts (CEAI); Appendix E -Commodity Forecast Methodology (TBS); and Appendix F-Interstate Compacts in Mid-America and Procedures Governing Civil Works Projects (IPA).

Tippetts-Abbett-McCarthy-Stratton, Temple, Barker and Sloane, Incorporated, Chase Econometric Associates, Incorporated, Institute of Public Administration, Maritime Administration Final Rpt. MA-PORT-970-79076, June 1979, 434 p.

Contract MA-7-38006

ACKNOWLEDGMENT: NTIS
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PB-299563/7ST

20 304583
CAPITAL REQUIREMENTS FOR THE TRANSPORTATION OF ENERGY MATERIALS BASED ON PIES SCENARIO ESTIMATES
In May 1978, Transportation and Economic Research Associates (TERA), Inc. completed a study in which information and methodologies were developed for the determination of capital requirements in the transportation of energy materials. This work was designed to aid EIA in the analysis of PIES solutions. The work consisted of the development of five algorithms which are used to estimate transportation-investment requirements associated with energy commodities and transportation modes. For the purpose of this analysis, TERA was provided with three PIES-solution scenarios for 1985. These are: Scenario A which assumes a high domestic economic rate of growth along with its corresponding high demand for petroleum, as well as a high domestic supply of petroleum; Scenario C which assumes a medium level of economic growth and petroleum demand and supply; and Scenario E which assumes a low level of economic growth and domestic demand and supply for petroleum. Two PIES-related outputs used in TERA's analysis are the "COOKIE" reports which present activity summaries by region and "PERUSE" printouts of solution files which give interregional flows by energy material. Only the transportation of four energy materials, crude oil, petroleum products, natural gas, and coal is considered. In estimating the capital costs of new or expanded capacity for the transportation of these materials, three transportation modes were examined: pipelines, water carriers (inland barge and deep draft vessels), and railroads. (ERA citation 04:030407)

Gezen, A Kendrick, MJ Khan, SS Mellen, NF
TERA, Incorporated, Department of Energy Aug. 1978, 364 p.

Contract EC-77-C-01-8596

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

TID-28915

20 307643
OUTLOOK FOR CANADIAN COAL IN WORLD MARKETS
Following periods of depressed prices and uncertain world markets, Canadian coal producers are predicting a rise in demand for both metallurgical and thermal coal. The improved outlook was the consensus from discussions held with representatives of several major companies, including Kaiser Resources, Fording Coal Limited, Denison Mines Limited, BP Canada Limited, and Elco Mining Limited.

Cobban, G *Coal Miner* Vol. 4 No. 2, June 1979, p 5

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

20 308430
DEREGULATION OF PRODUCE TRAFFIC: WILL THE RAILWAYS BE ABLE TO PRODUCE?
The deregulation of rail rates which has given railways pricing flexibility comparable to that of agricultural exemption motor carriers is claimed by its advocates to produce potentially significant shifts of perishables traffic from truck to rail. This paper assesses the potential for increased rail participation in produce traffic by examining cost, rate and service characteristics of truck and rail transport of perishables. Productivity, service quality and marketing all have roles.

Horn, KH (George Mason University) *Transportation Journal* Vol. 19 No. 1, 1979, pp 5-18, 13 Tab.

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21 300545
STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 26. THE RELATIONSHIP BETWEEN RAILROAD WORK RULES AND OPERATING PLANS
The issue of railroad work rule reform is addressed by analyzing the relationship between work rules and operating plans. In particular, the relationship between road crew consist and through train operation is studied. It is hypothesized that such a relationship exists and that work rule reform, implemented in concert with changes in operating plans, can decrease cost and improve service, without necessarily reducing employment. A theory of the work rule/operating plan relationship is developed and applied to the Boston and Maine Railroad. It is observed that decreased crew consist allows the operation of additional through trains which improve service at no extra cost, and that decreased employment need not result. The hypothesis is confirmed in the conclusion. It is emphasized that the possibilities of an agreement on work rule reform would be improved by an understanding of the work rule/operating plan relationship, with consideration of car hour costs being crucial to that understanding.

Morgenbesser
Massachusetts Institute of Technology CTS-78-6, Apr. 1978, n.p.

ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

21 300547
FINAL REPORT OF ST. LOUIS TERMINAL PROJECT
This publication is a schematic of the life of the St. Louis Terminal Project. It includes a summary and an analysis of the experiments completed and defines the future directions of the project.

St Louis Terminal Project, Federal Railroad Administration, Association of American Railroads, Missouri Pacific Railroad Company, Railroad Labor Organizations FRA-OPPD-77-9, Apr. 1977, 256 p., 2 App.

ORDER FROM: NTIS

21 300567
HOW SHORT-HAUL PIGGYBACK CAN BE MADE ECONOMIC
A major research effort is under way to reduce the cost and improve the quality of intermodal service. Recent concern over oil in the USA makes it desirable that merchandise moving over highways be transferred to rail. Although piggyback has proved a strong growth area, current emphasis is on hauls of 1500 km or more, even though 75 per cent of merchandise travels less than 1000 km. To penetrate this short-haul market, dedicated trains on fast and frequent schedules are essential; these can only be provided at acceptable cost if rules governing train manning are relaxed. Terminals and rolling stock are high-cost areas where technical and operational innovation are needed.

Heuer, J Eshelman, L (Kearney (AT) and Company Incorporated) *Railway Gazette International* Vol. 135 No. 8, Aug. 1979, pp 719-723, 4 Fig., 6 Phot.

ORDER FROM: ESL

DOTL JC

21 300568
RAIL CORNERS WASTE DISPOSAL
By 1983 there will be four solid waste rail transfer and compaction stations in London with just over a third of the capital's refuse going out by train. With the opening of the second such station this year, some 1600 tons of waste are being conveyed daily from the two points to landfill sites in Bedfordshire and Oxfordshire. A plan of the transfer facility is included.

Railway Gazette International Vol. 135 No. 8, Aug. 1979, pp 725-726, 2 Phot.

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21 300593
THE ROLE OF INTERMODAL SERVICE IN IMPROVING RAILROAD PRODUCTIVITY
This paper explores the issues underlying the role of intermodal service in improving railroad productivity. Because these issues are complex and because definitive answers require extensive research, the paper raises more questions than it answers.

Montgomery, AJ (Consolidated Rail Corporation) *Transportation Journal* Vol. 16 No. 4, 1977, pp 46-53

ACKNOWLEDGMENT: General Motors Research Laboratories (GMRL 77-179)
ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

21 300595
AGRICULTURAL TRANSPORTATION CRISIS: REPORT TO ACCOMPANY S. RES. 515
No Abstract.

United States Senate 1978, 15 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

21 300621
ROUTE SCHEDULER: A MACRO PLANNING MODEL FOR THE ANALYSIS OF TRAIN INTERFERENCE AND SCHEDULING
This paper presents a macro planning model which simulates train movements at a global level. It measures the effects of peaks and other important elements on the overall train performance. Train arrival times are not only affected by departure times but also by train speeds, meets and over-takes, station stops, crew changes and connections. Results from the model show numerically and graphically how changes in schedules, motive power and track or yard facilities affect transit time. It is being used as a planning tool for the creation of time tables, the evaluation of motive power changes, the analysis of the economics of future plant expansion and for testing the effect of track improvement and repair programs on train services.

Proceedings of the AIIE Annual Conference Convention 29th, Spring, Toronto, Ontario, May 23-26, 1978.

Dube, L (Canadian National Railways); Belshaw, PN
American Institute of Industrial Engineers AIIE P-78-4, 1978, pp 436-442

ACKNOWLEDGMENT: EI
ORDER FROM: American Institute of Industrial Engineers, 25 Technology Park/Atlanta, Norcross, Georgia, 30092

21 300622
ESTIMATING RAILROAD LINE CAPACITY
Burlington Northern is experiencing a rapid growth in coal traffic due to increasing demand for coal and Burlington Northern's access to major coal producing areas. To accommodate this traffic, Burlington Northern must increase the capacity of many of its line segments. An important part of planning orderly additions to capacity is an analysis of existing capabilities and future line capacity requirements. The Industrial Engineering Section of Burlington Northern provides such an analysis using several simulation models. "Estimating Railroad Line Capacity" discusses the determinants of line capacity and the use of simulation models in analyzing line capacity. Models for different purposes are defined and discussed. Results obtained from these models are summarized. Finally, the role of simulation in the Burlington Northern planning process is explained.

Proceedings of the Summer Computer Simulation Conference, Newport Beach, California, July 24-26, 1978.

Kehr, CL (Burlington Northern Incorporated); Kloer, CD Pai, AN
Society for Computer Simulation 1978, pp 427-434

ACKNOWLEDGMENT: EI
ORDER FROM: American Federation of Info Processing Societies, 210 Summit Avenue, Montvale, New Jersey, 07645

21 300627
MULTIOBJECTIVE LOAD MANAGEMENT TECHNIQUES FOR ELECTRIFIED TRANSPORTATION SYSTEMS
This paper develops a methodology for managing electric-train-loads through the adjustment of their trajectories in the 3-dimension space of speed, time and distance. The management process involves reconciling two conflicting objectives--the total energy, W, and the total time, T, required to complete each journey. A multiobjective approach is used. For a given hardware configuration, the approach generates a continuous curve (the "noninferior surface") that represents the best possible tradeoffs between W and T. By staying on this curve one can achieve energy savings with the least possible increase in T, and vice versa. The methodology can be used for comparing the management potential of various hardware alternatives, for

formulating permanent operating schedules or for identifying optimal short term conservation measures to cope with supply curtailments.

IEEE Power Engineering Society, Winter Meeting, Preprint, New York, New York, February 4-9, 1979.

Talukdar, SN (Carnegie-Mellon University); Koo, RL
Institute of Electrical and Electronics Engineers Paper F 79 160-3, 1979, 8 p., 36 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

21 300641
COAL TRANSPORTATION MODELS: THE USE, MISUSE, AND ABUSE OF DATA
Coal transportation models are compared in terms of their capacity to accurately state transport costs, which are central to coal utilization. Two types of models are discussed briefly: (1) network the Bechtel--Stanford Research Institute and Manalytics models); and (2) comparative-cost analysis of transport systems over specific routes and using different modes, such as unit train, slurry pipeline, barge, truck, or conveyor belt. The comparative-cost models require more reliable engineering and cost data. Cost comparisons are developed and a variety of problems, both economic and engineering, identified, with the suggestion that cooperation between the two disciplines is necessary for the problems to be solved.

Rieber, M (Arizona University) *Growth and Change* Vol. 10 No. 1, Jan. 1979, pp 130-136, 10 Ref.

ACKNOWLEDGMENT: Energy Research Abstracts
ORDER FROM: Kentucky University, College of Business and Economics, Lexington, Kentucky, 40506

21 301134
RAILWAY CAPACITY ANALYSIS AND RELATED METHODOLOGY
This study reviews the state of the art in defining railway capacity and its measures, identifies interest groups and highlights latest developments in techniques for capacity and related analyses in terms of capabilities and deficiencies. It is structured in three parts. Part A is an overview of railway capacity analysis. Part B covers methodology for capacity analysis. Part C discusses capacity issues and their impacts. Special attention is given to capacity, service and cost relationships and to cost and financial performance modelling.

Khan, AM (Carleton University, Canada)
Canadian Transport Commission 1979, 176 p., Figs., Tabs., 42 Ref.

ORDER FROM: Canadian Transport Commission, Systems Analysis Branch, 275 Slater Street, Ottawa, Ontario K1A 0N9, Canada
DOTL HE2806.K53

21 301438
OPERATION LANDFILL
A facility which compacts and containerizes up to 1200 tons of solid waste daily for rail transfer to landfill sites outside London is described. The Freightliner container cars and loading facility are like those used elsewhere on British Railways; a Private firm operates both the London facility and the disposal sites which are abandoned clay pits.

Clifford, S *Modern Railways* Vol. 36 No. 371, Aug. 1979, pp 344-345, 5 Phot.

ORDER FROM: ESL
DOTL JC

21 301708
RAPID SIMULATION OF THE PROCESS OF AN INCORRECT SHUNTING OPERATION USING THE HRA 7200 [Schnelle Simulation der Falschlaeuferbildung mit dem HRA 7200]
Study of the process involved in an incorrect shunting operation at a hump in a marshalling yard. The main point is to determine correction of the course of a following car from the previous one, taking account of time, rolling characteristics, wind speed, line profile and other parameters. Reproduction on a hybrid computer system. Application to avoid shunting errors. Plans for marshalling yards and the automation thereof. [German]

Bechtel, J *Hochschule f Verkehrs F List Wissenschaft Zeitschr* Vol. 26 No. 1, 1979, pp 89-97, 6 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hochschule fuer Verkehrswesen Friedrich List, Friedrich List Platz 1, Dresden 801, East Germany

21 301715
EFFICACY OF INDUSTRIAL TELEVISION IN MARSHALLING YARD HUMP OPERATIONS [Effektivnost televidenija na sortirovocnoj gorke]
The article describes the introduction of industrial television in the shunting movements of the locomotives, the location of cars and cuts of cars on sorting tracks, the switching of cars, formation of trains, trains waiting to leave, and the dispatching process. [Russian]

Dunaev, NI *Avtomatika, Telemekhanika i Svyaz* No. 6, June 1979, 37 p., 2 Phot.

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

21 301726
DEVELOPMENT OF CONTAINER TRANSPORT AND INCREASE IN ITS EFFICIENCY [O razvitii kontejnernyh perevozok i povysenii ih effecktivnosti]
Proposals regarding increases in the parameters of containers, cars and cranes with high lifting capacities. [Russian]

Kogan, LA *Vestnik VNIIZT* No. 3, 1979, pp 10-14, 3 Tab.

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

21 302137
HIGHER SPEEDS AND HEAVIER LOADS
Within the last 10 years, maximum speeds of 100 and 75 km/h which had been in force on the broad and metre gauge respectively for many decades have been raised to 130 and 100 km/h. This was possible because careful research revealed ways in which new rolling stock and costly strengthening of the infrastructure could be avoided, still keeping maintenance within acceptable limits. Research into still higher speeds continues, but there is more emphasis now on increasing the weight of trains so as to raise capacity.

Jacob, KA *Railway Gazette International* Vol. 135 No. 7, July 1979, pp 635-638

ACKNOWLEDGMENT: British Railways
ORDER FROM: ESL
DOTL JC

21 302142
A NEW CONTAINER HANDLING METHOD 1. HANDLING APPARATUS
The first part of the article deals with handling apparatus, i.e., the sub-systems handling, storage and conveying at a container terminal. The studies were concentrated on the development of apparatus to supplant the present shunting of container wagons by shifting the containers below the overhead contact line on the DB's electrified lines. Apparatus for all-mechanical, part-automatic and all-automatic operation permits transfer between road and rail and between rail and rail. The handling apparatus consists of a unit for container transhipping and a portal crane with L-shaped load carrier. The unit permits the choice of a suitable handling apparatus for every requirement, and thus allows use of the most economical method. It consists of the variation and combination of the main assemblies, i.e., load carrier, slewing gear, lifting gear, supporting gear and travelling gear. If more than two transport ways are to be served by a handling apparatus, the container crane with L-shaped load carrier is the most suitable arrangement. An L-shaped support with suspended spreader and grabs allows passage below the over-head lines and transfer of the container. Such handling apparatus can be used by large industrial and commercial firms, carriers and forwarders, and at inland terminals of the DB. The latter application will be described in Part II. "Inland terminals", to be published in No. 7/8 of the ETR. [German]

Kunder, R Porsch, M *Eisenbahntechnische Rundschau* Vol. 28 No. 5, May 1979, pp 395-404

ACKNOWLEDGMENT: British Railways

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

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21 302163
THE ELUSIVE GOAL
While U.S. has only one automated railroad, the Muskingum Electric which is a private carrier, many facets of railroading short of train operation are already under automatic control. Automation of two other private railroads, the Black Mesa and Lake Powell and the ore-hauling operation of Climax Molybdenum in Colorado, has never been complete despite early reports. The role of railroad labor in automation to date presages little progress in the future. Even remote control of locomotives has not been possible except on industrial railroads.

Shaffer, FE *Modern Railroads/Rail Transit* Vol. 34 No. 11, Oct. 1979, pp 68-69, 2 Phot.

ORDER FROM: ESL

DOTL JC

21 302338
ECONOMICS OF IMPROVED TOFC/COFC SYSTEMS
The growth of Trailer on Flat Car/Container on Flat Car (TOFC/COFC) traffic reflects the ability of railroads to provide highway competitive service. Next to coal, it is the largest and fastest growing railroad traffic. The success of future rail intermodal traffic hinges on satisfying demand, meeting new market needs, and realizing railroad profit objectives. To look at these opportunities, the Federal Railroad Administration has sponsored a major on-going intermodal study (one of several) to evaluate present, proposed, and needed technologies to achieve those ends. This Phase I preliminary study examines the economics and markets of present, proposed and conceptual systems. This paper summarizes a portion of the study relating to analysis of present and proposed systems and how each rank with respect to one another, common motor carriers and owners-operators. Study findings are encouraging and suggest opportunities for more cost-effective systems and more market responsive service capabilities. Contemporary costing procedures plus specially developed life cycle costing and terminal model were used. Many unit costs were developed on an engineered basis. The Bimodal Roadrailer emerged as a promising new system. The Santa Fe "Ten Pack" and Paton Low Profile system showed significant superiority as improvements to present Trailer on Flat Car systems. The Southern Pacific Double Stack Container car offers greatest promise for Container on Flat Car Systems.

Leilich, RH (Peat, Marwick, Mitchell and Company) *Transportation Research Record* No. 721, 1979, n.p.

ORDER FROM: TRB Publications Off

DOTL JC

21 302352
IMPLEMENTING AN OPERATING/SERVICE PLAN ON BOSTON & MAINE
This paper describes the planning process that led to adoptation of a comprehensive set of recommendations for improving service and car utilization on Boston & Maine. When fully implemented these recommended operating changes will provide a 10 percent improvement in trip times and reliability, reduce total costs and improve the potential for traffic growth. To assure successful implementation, B&M has established an inter-departmental service committee, created a Car Utilization Department, expanded its marketing and data systems departments, begun rehabilitating key facilities and upgraded its management information system.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Martland, CD Messner, MG (Massachusetts Institute of Technology); Rennicke, WJ (Boston & Maine)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 245-253

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

21 302353
DEVELOPING AN OPTIMUM CLASSIFICATION STRATEGY FOR RAIL FREIGHT CARS
This paper describes development of a model that would generate an optimum rail classification strategy. With mathematical optimization, the model determines the best classification strategy for a given rail system considering the activities at all yards simultaneously. A preliminary model has been completed and favorable results were obtained from an actual test case.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Kedar, R (Federal Railroad Administration)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 254-258, 1 App.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

21 302354
FILLING BACKHAULS AND CROSSHAULS: TWO CASE STUDIES
Approaches to filling empty backhauls include pricing and supply of free-running cars to certain shippers in place of assigned cars to destinations where general service cars are returning empty anyway. This reports two studies by Burlington Northern. Study 1 covers improvement in freight car utilization and recapture of traffic lost to other modes through introduction of backhaul rates. Study 2 covers the substitution of free runners for assigned cars of a Minnesota shipper with regular movements to West Coast destinations. The resultant savings in car time were quantified. Six conclusions are drawn from these innovations.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

French, PW Schmidt, RB (Burlington Northern)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 259-268

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

21 302355
POTENTIAL INTERMODAL TRANSPORTATION OF PERISHABLES FROM THE LOWER RIO GRANDE VALLEY OF TEXAS TO THE MIDWEST
Although motor carriers predominate in movement of fresh produce from the Lower Rio Grande Valley of Texas to the midwest, there are certain characteristics of the highway and rail modes which are of interest to shippers. Railroads suffer from excessive transit time; motor carrier rates fluctuate widely and both modes have occassional equipment shortages. An intermodal system is described which incorporates characteristics of both truck and rail that should be superior to the current modes in terms of reliability and cost.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Hascall, WT Lamkin, JT (Texas Transportation Institute); LeBlanc, JA (Southwestern Louisiana)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 276-282, 3 Fig., 5 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

21 302388
WHAT FUTURE FOR FREIGHTLINER?
The return of the rail and road container company, Freightliners Ltd as an autonomous profit center within the British Rail organization as from August 1978 is considered by the author to be of benefit to both organizations. With some 750,000 containers carried each year and 200 daily services between 36 terminals-11 of these privately owned, the Freightliner system possesses some 600 trucks and 8,000 containers, all to be integrated within the larger BR orgainzation. Information is provided on freightliner operations with details (and photographs) of traffic, equipment and terminals, and the joint operations now possible within the BR organization of Speedlink and freightliner trains. It is suggested that some of the first generation terminals are now outdated and inefficient as regards equipment and layout, and major decisions that will have to be taken by BR in re-equipment to accommodate changing traffic patterns-size, weight and number of containers are discussed. Reference is made to future requirements for additional types of freightliner vehicles and containers, the need for new terminals and more conventional handling gear.

Mortimer, P *Modern Transport* No. 7, 1979, pp 169-173, 11 Phot.
ACKNOWLEDGMENT: TRRL (IRRD 242195)
ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

21 302696
WILL "SPRINT" FINISH IN THE MONEY?
The FRA-sponsored demonstration of short, fast piggyback trains between Chicago and the Twin Cities by Milwaukee Road will continue into 1980 because of results obtained through the first 16 months of the operation. Trailer movement has grown steadily with most being new business rather than diversion from box cars or from other roads' piggyback services; load factor and traffic balance has improved. The small train crews and extended districts produce new levels of productivity as does the utilization of cars and locomotives. Milwaukee sees service being more competitive if more departures could be scheduled daily.

Railway Age Vol. 180 No. 20, Oct. 1979, pp 26-27, 1 Phot.

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21 302698
HOW SP CUTS EMPTY-CAR MILES
Southern Pacific has undertaken a marketing strategy aimed at reducing the movement of empty freight cars; through the first three quarters of 1979 there was a 6 percent improvement in the enpty-to-total car miles with a consequent $6 million improvement in profits. No longer are foreign cars routed home empty automatically and SP does not seek rapid return of its empty cars from other lines if with some "repositioning" a backhaul may be obtained even if the profitability of that specific movement is not as high as the original loaded trip. The costs of empty car transportation are assessed along with per diem costs, striving to manage the profitability of car usage over time. The new approach requires cooperation with connecting lines of which Conrail has been most prominent.

Malone, F *Railway Age* Vol. 180 No. 20, Oct. 1979, pp 48-50, 1 Phot.

ORDER FROM: ESL

DOTL JC

21 303198
NEW APPROACHES TO YARD AUTOMATION IN JAPAN
Automation features in Musashino Yard of the Japanese National Railroads are presented and discussed.

Middleton, WD *Railway Age* Vol. 180 No. 3, Feb. 1979, pp 46-49

ACKNOWLEDGMENT: EI
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21 303588
TRANSFER VEHICLE OPENS THE DOOR TO SMALL CONTAINER TERMINALS
The ULS vehicle, a rail-mounted unit financed by German's Federal Ministry of Research and Technology, is designed to perform intermodal transfer of containers from road to rail and vice versa. All handling gear is hydraulically powered and the vehicle requires an adjacent track from which to load or unload a train. Cantilever arms, when swung out on both sides, allow a spreader to lift and transfer a container across the ULS to a car, road vehicle, loading platform or the ground.

Railway Gazette International Vol. 135 No. 12, Dec. 1979, p 1116, 1 Phot.

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21 303628
DISTRIBUTION OF TRAFFIC FLOWS WHEN PREPARING ECONOMIC ASSESSMENT IN TRANSPORT [Raspredelenie planovyh gruzopotokov pri rascete transportno-ekonomiceskih balansov]
A mathematical model of the distribution of traffic flows on railway lines in relation to possible throughput, for economic studies in the context of short-term planning. [Russian]

Ilovajskij, NS *Vestnik VNIIZT* No. 4, 1979, pp 12-16, 5 Phot.

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

21 303671
15 YEARS OF OPERATING EXPERIENCE ON THE LAMCO RAILROAD
Liberia's Lamco Railroad was constructed for the transport of iron ore involving high axle loads. The 270-km line has been operating since 1963, handling 90-car unit trains. Due to the specific type of operation, problems have been experienced with rail and wheel wear, in-track welding, and line capacity. With its present sidings, rolling stock and centralized traffic control, the railroad is close to maximum capacity and any further increase will call for major investments.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Bas Koenen, HN (Lamco J.V. Operating Company, Liberia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 105 Pap A.2, 1978, pp 1-11, 12 Tab., 3 App.

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

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21 303674
OPTIMISATION ANALYSIS FOR ECONOMIC GENERATION OF TRANSPORT CAPACITY ON HEAVY HAUL RAILWAYS
This paper deals with criteria for optimizing the following civil engineering parameters to maximize economically the capacity of a railway line: Gauge, ruling grade, maximum curvature, clearances, spacing of passing sidings, length of sidings, loading standards and longitudinal forces on bridges. The methodology involves unit cost curves for phasing capital inputs at increasing traffic levels. A break-even analysis determines traffic levels at which it would become economical to convert from narrow to standard or broad gauge since the unit cost of haulage has an optimal traffic level which varies with gauge.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Rama Rao, BV (Western Railway, India)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 202 Pap B.1, 1978, pp 1-11, 8 Fig., 2 Tab., 2 Ref.

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

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21 303679
TRAIN SIZE OPTIMIZATION FOR THE CARAJAS PROJECT
Train size calculation is of fundamental importance for operation of an iron-ore railway. High investments in rolling stock, sidings, yards, and high operating costs make it difficult to choose the best train size. The paper, divided in two parts, first takes up theoretical work on the effect of train length on line and track capacity with the queueing theory used to analyze single-track operation. Practical work then shows application of this theory to determine an ore-train size for Brazil's Carajas Project where the number of locomotive units and their rating along with train length were determined.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Albernaz, MAF
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 206 Pap B.4, 1978, pp 1-7, Tabs.

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

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21 303682
SYSTEM UTILISATION
A railway such as Australia's Hamersley operation requires recognition of traditional safety and operating procedures, but to operate efficiently it is necessary to tailor the system to the unique requirements of a heavy-haul

"closed loop" system. This paper illustrates the use of a queueing theory in a modified but practical manner. It will show that full benefit of the theory cannot be obtained unless reliable and comprehensible information and monitoring systems are established.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Murchie, KC (Hamersley Iron Proprietary Limited, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 210 Pap C.1, 1978, pp 1-5, 1 Fig.

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

DOTL RP

21 303683
PROGRESS IN TRAIN PERFORMANCE SIMULATORS
Detailed study of train performance becomes important when a $10 million unit train is handled by a single engineman. This paper presents an advance in train performance simulation. Main inputs are tractive force, fuel consumptions, braking force, rolling resistance, train weight, number of locomotive units and cars, grades, curves, speed limits and location of sidings. The computer program, Train Performance Optimizer (TPO) is used for dimensioning of rolling stock, evaluating locomotive types, determining train length and power/weight ratios, analyzing alternatives for new branches, estimating operating costs and formulating realistic schedules.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Albernaz, MAF
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 211 Pap C.2, 1978, pp 1-5

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

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21 303686
A COMPARISON OF THEORETICAL AND ACTUAL TRAFFIC SCHEDULES ON THE MT. NEWMAN RAILROAD
The theory and practice of scheduling trains on a heavy-haul unit-train operation are compared. On unit train operations there is usually not a chance to "catch up" after there has been a disturbance to the timetable. It is important to be able to predict the average trip times to be expected. Two different theoretical methods for calculation are presented (simulation and queueing theory) and the results of the calculations are shown to give good agreement with actual travel times recorded on Australia's Mt. Newman Railroad.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Purdon, RL (Mt. Newman Mining Company Pty Ltd, Australia); Elbrond, J (Ecole Polytechnique de Montreal, Canada); Clark, JM (Mt. Newman Mining Company Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 215 Pap C.4, 1978, pp 1-7, 9 Fig., 4 Tab., 2 App.

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

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21 303719
ORE TRANSPORT IN SOUTH AFRICA: SISHEN-SALDANHA
South African Railways acquired the Sishen-Saldanha iron ore transportation facilities during final construction. Information on this narrow-gauge heavy haul electrified railway and operating experiences during the first two years are described.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Le Roux, AS
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 501 Pap A.5, 1978, pp 1-4, 2 Tab.

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

DOTL RP

21 303720
HEAVY RAIL CONVOY TRAFFIC IN DESERT ZONES
The 650-km iron ore railway through the Maritanian desert has presented major problems with high temperatures, low humidity, prevailing winds and drifting sand. It has been demonstrated that railways and rolling stock can be adapted to desert regions. Sand drifts, wheel wear, rail wear, ballast fouling and locomotive air filtration have all received special attention.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Guittard, R
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 502 Pap A.6, 1978, pp 1-6, 4 Fig.

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21 303721
FOUR HUNDRED MILLION TONNES--AN ODYSSEY
Australia's Mt. Newman railroad was constructed in the late 1960s to American standards in one of the most inhospitable areas on the earth. Traffic has steadily increased as iron-ore demand grew. The railroad has experienced problems with its loading and unloading operations, roller bearings, locomotive reliability and line capacity. Emphasis is now on automatic car inspection, computer-based train control systems and redefinition of track standards.

Heavy Haul Railways Conference held September 18-22, 1978, Perth, Western Australia. Sponsored by Cliffs Robe River Iron Associates, Goldsworthy Mining Limited, Hamersley Iron Proprietary Limited, Mt. Newman Mining Company Proprietary Limited and Westrail.

Murphy, RS Peake, PJ (Mt. Newman Mining Company Pty Ltd, Australia)
Institution of Engineers, Australia, Australasian Institute of Mining and Metallurgy Conf Paper Session 503 Pap A.7, 1978, pp 1-5

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

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21 304627
CLASSIFICATION YARD CAPACITY AND HUMP YARD SIMULATION MODEL
The CAPACY model was designed to emulate manual capacity calculations for railroad classification yards. The output from this simulation model can help in planning railroad classification yards. By running this program with different traffic level inputs and analyzing the simulation output, one can estimate the type ad size of classification yard need. The profile simulation program was written to help in designing a hump yard. Optimum hump yard grades and retarder placements can be extracted from the outputs of this simulation program. The movement of railroad cars over different hump yard designs can be discovered before implementation. This simulation program is a preliminary version and may be changed subsequent to utilization. Contacting the Transportation System Center regarding the current status of the program is recommended...Software Description: The program is written in the Fortran programming Language for implementation on a DEC System-10 computer using the TOPS-10 operating system. 80K bytes of core storage are required to operate the model.

See also RRIS 21 304628; Bulletin 8001. 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, PB-300 326.

Hopkins, JB McGrath, TP
Transportation Systems Center DOT/DF-79/001, Aug. 1979, n.p.

ACKNOWLEDGMENT: NTIS

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PB-300325/8ST, DOTL NTIS

21 304628
CLASSIFICATION YARD CAPACITY AND HUMP YARD SIMULATION MODEL DOCUMENTATION
The Capacy model was designed to emulate manual capacity calculations for railroad classification yards. The output from this simulation model can help in planning railroad classification yards. By running this program with different traffic level inputs and analyzing the simulation output, one can estimate the type and size of classification yard needed. The Profile simulation program was written to help in designing a hump yard. Optimum hump yard grades and retarder placements can be extracted from the outputs of this simulation program. The movement of railroad cars over different hump yard profiles can be simulated, so that the consequences of different hump yard designs can be discovered before implementation. This simulation program is a preliminary version and may be changed subsequent to utilization. Contacting the Transportation Systems Center regarding the current status of the program is recommended.

See also RRIS 21 304627 for system on magnetic tape; Bulletin 8001.

Stock, WA Elliot, CV
SRI International, Transportation Systems Center 6364, DOT/DF-79/001A, July 1978, 78 p.

ACKNOWLEDGMENT: NTIS
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PB-300326/6ST, DOTL NTIS

21 307652
PROBLEMS OF FREIGHT TRAIN TRANSITABILITY--SUBSTANTIATION OF METHOD, CALCULATION AND ALGORITHM
The possibility of using the principles of the mathematical method of dynamic programming to calculate the increase in transitability is shown with a model calculation based on incrementing the capacity of car streams from origins and ensuring the arrival of these streams at destination with a maximum proportion of through (transit) trains. An algorithm has been compiled for the EC type computer and a Fortran oriented program. Data of the effectiveness of the proposed calculation is given which along with existing methods enables the available potential of transitability of car flows to be realized on a new basis.

Avetikyan, AA *Rail International* Vol. 10 No. 6, June 1979, pp 538-546, 9 Ref.

ACKNOWLEDGMENT: EI
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DOTL JC

21 307669
AUTOMATION OF MARSHALLING YARDS WITH PARTICULAR REFERENCE TO LINEAR MOTORS
Systems in use in Europe and Japan are described in which wagons are propelled along classification tracks by propulsion and braking units so controlled that impact between them is minimized. A CNR simulation of yard operation using linear induction motors proved their benefits.

Barwell, FT Leech, DJ *Institution of Civil Engineers, Proceedings* Vol. 67 No. 2, Sept. 1979, pp 627-651, 15 Fig., 7 Tab., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

21 307680
RESEARCH CONDUCTED IN A LARGE CITY SELECTED WITH A VIEW TO SETTING UP AN INNER-CITY GOODS SUPPLY SYSTEM USING THE RAPID TRANSIT RAILWAY [Untersuchungen in einer ausgewaehlten Grosstadt zur Realisierung eines innerstaedtischen Gueterversorgungssystems unter Einbeziehung von Stadtschnellbahnen]
The article describes the results of a study of a system to supply 520 t of goods a day to the centre of Hamburg using 2 metropolitan railway lines. Due to the volume of passenger traffic in existing metropolitan stations, it would be necessary to envisage new construction. For the transport of goods, special containers are used, whilst the transport between station and ships is carried out either by underground conveyors, or by electric vehicles at street level. The cost of such a system is only slightly higher than transport by lorry, but it appears that the particularly favorable conditions encountered in Hamburg cannot easily be provided in other cities. [German]

Heckler, W *Internationales Verkehrswesen* Vol. 31 No. 4, July 1979, pp 195-197

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

21 307681
"TARGET SHOOTING." MARSHALLING YARD AUTOMATION POSSIBILITIES [Laufzielbremsung. Moeglichkeit der Automatisierung von Rangierbahnhoefen]
Although the DB has installed several large marshalling yards and set up railway centres specially designed to handle containers, a still larger number of medium-sized yards will have to be operated in a more rational way in the future. "Target shooting" methods of marshalling have been developed for this purpose in France and the GFR, and tests have also been carried out at Offenburg. [German]

Bernstein, G *Internationales Verkehrswesen* Vol. 31 No. 4, July 1979, pp 238-240, 2 Ref.

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

21 307683
POSSIBILITIES FOR IMPROVEMENT OF COMBINED FREIGHT TRANSPORT [Verbesserungsmoeglichkeiten fuer den kombinierten Ladungsverkehr]
To avoid loss of time in marshalling yards and reduce transport costs, a system of wagon transport has been devised which offers night services between a large number of dispatch and destination points. To improve transhipment, special equipment (the Laessig/Schwanhaeusser ULS) has been designed. [German]

Schwanhaeusser, W Walther, K *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 543-547, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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21 307684
ULS: A NEW HANDLING DEVICE FOR COMBINED FREIGHT TRANSPORT [ULS: ein neues Umschlaggeraet fuer den kombinierten Ladungsverkehr]
This new transhipment device is a railway vehicle running on rails which can be used for horizontal transhipment of large containers. It enables a container to be transshipped in two and a half minutes from one container wagon to another or on to a lorry or ramp with live overhead equipment. Its specifications as a rail vehicle comply with national and international railway regulations, and it can be forwarded in sets at speeds up to 100 km/h. [German]

Littmann, R *Eisenbahntechnische Rundschau* Vol. 28 No. 7-8, 1979, pp 549-551, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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21 308296
DEVELOPMENT OF CONTAINER TRANSPORT ON THE PKP UP TO 1985 [Rozwoj kontenerowego systemu transportowego (KST) do 1985 roku]
No Abstract. [Polish]

Januszewski, A Jalocha-Koch, H *Prace COBiRTK* No. 74, 1979, pp 21-25, 4 Tab., 14 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Prace COBiRTK, Warsaw, Poland

21 308448
SPECIAL REPORT: THE UNIT COAL-TRAIN SYSTEM
In 1960 unit coal-train operations were isolated efforts by individual railroads to outbid competitive coal-transport systems. Since then the shuttling of individual coal trains has developed into a broad fuel-use system encompassing the coal mines, the railroads and the electric utilities. This special report describes the system achieved in terms of all its facets. The individual articles: The unit coal-train operation grows into a fuel-use system; Unit train cars are upgraded for mine-to-plant shuttle service; A unit coal-train system is more than a train running down a track; East goes West in quest to meet EPA stack requirements; Unit coal-train shuttling is now a total fuel-use system; How unit coal-train equipment is maintained and repaired; What is the unit coal-train system worth to all of us? Railroads' upgrading efforts boost coal-hauling capabilities; Unit coal train systems' future is complex, yet full of opportunity.

Address requests to Reprint Editor.

McGraw, MG *Electrical World* Vol. 192 No. 8, Oct. 1979, pp 51-82, 32 Fig., 9 Tab.

ORDER FROM: McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

DOTL JC

22 195765
CRITICAL ISSUES IN COAL TRANSPORTATION SYSTEMS--COMMITTEE REPORT
This report consists of conclusions and recommendations derived from the Symposium on Critical Issues in Coal Transportation Systems held on June 14-15, 1978. Conclusions and recommendations are made in the areas of economic regulation, environmental concerns, systems approach, public acceptance, international trade, frozen coal, sludge removal, year-round Great Lakes navigation, security, and congested waterways.

This is a report of work supported by the Departments of Commerce, Defense, and Transportation under provisions of Contract N00014-75-C-0711 between the National Academy of Sciences and the Office of Naval Research.

Maritime Transportation Research Board Apr. 1979, 14 p.

Contract N00014-75-C-0711

ACKNOWLEDGMENT: Maritime Transportation Research Board
ORDER FROM: Maritime Transportation Research Board, National Research Council, 2101 Constitution Ave., N.W., Washington, D.C., 20418
AD-A070370/2ST

22 197962
RADIO FREQUENCY LIQUID LEVEL GAUGING IN PROPANE TANK CAR SAFETY TESTS-A FEASIBILITY STUDY
Selected radio frequency (rf) resonances of an empty 30,300 liter (8,000 gallon) tank car have been measured to determine whether rf can be used to gauge the propane liquid levels during tank car fire safety tests. The change of resonant frequencies of a small horizontal cylindrical tank as a function of liquid volume has been tested in order to estimate the precision to which the amount of propane in a tank car can be measured. The technique is applicable to routine tank car gauging.

Siegwarth, JD
National Bureau of Standards, (NBS-7360460) NBSIR-79-1600, Jan. 1979, 15 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-292978/4ST

22 198146
DIRECT AND INDIRECT COSTS OF TRANSPORTING WOOD CHIPS TO SUPPLY A WOOD-FIRED POWER PLANT
Several alternative designs of a transportation system for a hypothetical 50-Mw WFPP in Vermont are reported. Two means--truck and rail--of moving the fuel, wood chips, from the harvest site to the WFPP are investigated. The design of an efficient truck transportation system must take into account vehicle weight and capacity, plant production capacity, distance to plant and time required to drive it, and comparative costs of different fleet management options. Considerations for a rail system include ease of connection to regular rail service (schedules and routes), comparative costs of owning versus renting railcars, comparative costs and scheduling problems for running plant-owned or leased unit trains, and costs of building additional track. Either transportation system will require special techniques for loading and unloading wood chips. The direct cost of both systems, with their possible variations is summarized as accurately as possible, and the general cost ranges of the two are compared. Although cost factors will vary greatly depending on the location and particular design specifications of the WFPP, it is concluded that the 35-truck fleet is probably the least-cost system in terms of capital costs. The three factors analyzed as indirect costs are highway maintenance costs, noise levels, and roadway structure problems. The analysis concludes that the specific WFPP site has a strong influence on the costs--direct and indirect--of the various possible transportation systems. For each site, a complete cost analysis is recommended, the framework of which is sketched in this study. (ERA citation 04:022062)

Adler, TJ Blakey, M Meyer, T
Thayer School of Engineering, Department of Energy Apr. 1978, 77 p.

Contract EG-77-C-02-4487

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
TID-28737

22 198148
DISAGGREGATING PIES FUEL FORECASTS, VALIDATING PIES TRANSPORTATION MODEL DATA BASE, AND OTHER TECHNICAL SERVICES
Three research tasks concerned with modifications and/or alterations to the PIES (Project Independence Evaluation System) and one auxiliary research task are reported. The first task, a modification to the transportation data base for petroleum refining regions, was necessitated by a proposed change of the present seven refining districts to ten refining districts. Five of the "Standard Tables" on transportation costs required changes. Tariffs and route descriptions are given in interregional pipeline rates for crude oil and petroleum products. Pipeline tariffs and tanker costs for distribution of Alaskan oil to PIES refining regions are tabulated. In the second task the structure of the coal transportation submodel in PIES was changed by building a simplified transshipment network which makes it possible to easily track coal from the mine to the point of use. The third task is a brief description of natural gas rates and rate making practices in the U.S. The fourth task analyzes differences in actual wholesale prices in various other locations in a region (as opposed to the PIES centroid) with respect to the differences in transportation costs. (ERA citation 04:023416)

Transportation & Economic Research Associates, Inc, Department of Energy Sept. 1978, 84 p.

Contract EM-77-C-01-8578

ACKNOWLEDGMENT: NTIS
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TID-29000

22 198358
A NEW OPTIMIZATION METHOD FOR LARGE-SCALE FIXED CHARGE TRANSPORTATION PROBLEMS
This paper presents a branch-and-bound algorithm for solving fixed charge transportation problems where not all cells exist. The algorithm exploits the absence of full problem density in several ways, thus yielding a procedure which is especially applicable to solving real-world problems which are normally quite sparse. Additionally, streamlined new procedures for pruning the decision tree and calculating penalties are presented. We present computational experience with both a set of large test problems and a set of dense test problems from the literature. Comparisons with other codes are uniformly favorable to the new method, which runs more than twice as fast as the best alternative. (Author)

Barr, RS Glover, FW Klingman, DD
Texas University, Austin CCS-350, Mar. 1979, 44 p.

Contract N00014-75-C-0616

ACKNOWLEDGMENT: NTIS
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22 198397
A SINGLE SOURCE TRANSPORTATION ALGORITHM
A single source transportation problem is an ordinary transportation problem with the additional requirement that the entire demand at each demand location be supplied from a single supply location. It is a special case of Ross and Soland's generalized assignment problem. Such problems occur frequently in applications. This paper gives two heuristic solution methods and a branch and bound algorithm for solving single source transportation problems. A discussion of the branching rules, variable fixing rules, and the computation of weak lower bounds is given. Computational experience with the solution of randomly generated problems having up to 40,000 integer variables is reported. (Author)

Nagelhout, RV Thompson, GL
Carnegie-Mellon University MSRR-429, Feb. 1979, 36 p.

Contract N00014-75-C-0621

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A068237/7ST

22 198631
REGIONAL GRAIN COOPERATIVES, 1976 AND 1977
This report reflects 1976 and 1977 fiscal year operations of 14 primary regional and 4 interregional grain cooperatives. The 18 cooperatives represent about 97 percent of total grain volume of all regional cooperatives.

Grain volume for the 14 primary regional grain cooperatives and 4 interregionals totaled a net of 1.9 billion bushels in fiscal 1976 and 1.8 billion in 1977 compared to 1.6 billion bushels in 1974. Corn was the leading grain handled by the 18 regionals--totaling 695 million bushels followed closely by wheat with 571 million bushels. Together corn and wheat comprised 68 percent of regionals' volume. The 18 regionals disposed of their grain in fiscal 1977 by processing 8 percent in their own plants, selling 35 percent to domestic outlets, and shipping 57 percent to ports for export. Export volume in fiscal 1976 and 1977 was slightly over 1.0 billion bushels.

Thurston, SK
Department of Agriculture Final Rpt. FCRR-6, Apr. 1979, 37 p.

ACKNOWLEDGMENT: NTIS
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PB-295761/1ST

22 198632
COOPERATIVE TRANSPORTATION AND DISTRIBUTION
This study evaluates the importance of total physical distribution in farm marketing or supply cooperatives. The managing of products or materials to or from cooperatives is covered including transportation, warehousing or storage, order processing, inventory management, materials handling, packaging, and plant location. The study covered 34 cooperative processors in 12 States who are shipping a total of 4.5 billion pounds annually. Findings showed that the large shipping volume makes it possible for many of these cooperatives to join in coordinated transportation and distribution programs which reduce transportation, warehousing, and handling costs and improve services to customers.

Department of Agriculture CIR-1-SECT-12, Sept. 1978, 27 p.

ACKNOWLEDGMENT: NTIS
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PB-295777/7ST

22 198699
PIGGYBACKING FRESH VEGETABLES: CALIFORNIA TO THE MIDWEST AND NORTHEAST
The study, conducted at the request of the Grower-Shipper Vegetable Association of Central California, was made to determine the best way to improve the present system of distributing perishable commodities and to find alternatives for obtaining truck trailers to be used in possible rail piggyback service. The study included an analysis of the organization structure--farmer cooperative, shippers association, forwarding company or other--necessary to finance and operate a shipper controlled program to transport produce from California to midwest and northeast markets.

Prepared in cooperation with Agricultural Marketing Service, Washington, DC.

Brooks, EE Byrne, RJ
Department of Agriculture, Department of Agriculture FCRR-10, May 1979, 75 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-297050/7ST

22 198708
CONCEPTUAL DESIGN OF A SHIPPING CONTAINER FOR TRANSPORTING HIGH-LEVEL WASTE BY RAILROAD
A shipping cask uniquely designed to transport solidified high-level wastes (SHLW) from a reprocessing plant to a federal repository has not yet been developed. The amount of material that would be transported and the anticipated characteristics of the SHLW suggest that rail casks will be favored for this transportation because of cost and logistic considerations. The document presents the results of a study to develop a conceptual design for a rail cask for transporting SHLW and to construct scale models of the conceptual cask with accompanying graphics for use at technical meetings and in public information displays. Two 1/10 scale models of the conceptual cask and two H0 gauge (1/87 scale) models of the cask/railcar system have been constructed. A description of the models and accompanying graphics is presented in Appendix A. (ERA citation 04:027468)

Peterson, PL Rhoads, RE
Battelle Memorial Institute/Pacific Northwest Labs, Department of Energy Dec. 1978, 70 p.

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS
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PNL-2244

22 300625
EXPERIMENTAL STUDY OF MOISTURE TRANSFER IN BULK COAL SUBJECT TO FREEZING
The moist bulky materials, such as coal, pose problems in materials handling (unloading after exposure to low temperatures) in cold weather regions. A relationship between the diffusion coefficients and the specific water content in the coal was established, and "safe" moisture values (at which the coal does not freeze) for a Yakutian coal were obtained. The results are applicable to other coals.

Yefimov, SS (USSR Academy of Sciences); Nikitina, LM *Heat Transfer-Soviet Research* Vol. 10 No. 2, Mar. 1978, pp 46-52, 14 Ref.

ACKNOWLEDGMENT: EI
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22 301196
MODEL FOR EVALUATING ALTERNATE ROUTES FOR EXPORTING BULK COMMODITIES FROM AN INLAND LOCATION TO OVERSEAS MARKETS
A model is described for evaluating alternate routes for exporting bulk commodities from an inland location to overseas markets. The model estimates the total economic costs of movement including rail movement costs (via unit train operation) over alternate routes, port costs at alternate sites, and the differences in shipping costs between alternate ports and overseas destinations. There is considerable disaggregation in the estimates of costs for each category, particularly for rail costs. There are numerous feedback loops and interactions among various components of the model. Because it is computerized in an interactive mode, one may examine, upon command, the implications of alternative assumptions about volumes, routes, cost components, and operating conditions. It is a detailed model of moderate sophistication in operations research techniques, yet, it can be used readily by decision-makers. Although the model is applicable to any bulk-commodity movement, it was developed and applied to the prospective movement of coal from interior British Columbia.

Doll, CL *INFOR Journal/CORS* Vol. 17 No. 1, Feb. 1979, pp 1-15, 1 Ref.

ACKNOWLEDGMENT: EI
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22 301390
THE BULK ERA
This article surveys what the author considers to be the key innovations in bulk handling techniques of recent years: the so-called systems approach, transshipment terminals, innovations in receiving, stockpiling and reclaiming, state-of-the-art shiploading and unloading equipment, and slurry pipelines.

Yu, AT (ORBA Corporation) *Traffic World* Vol. 179 No. 13, Sept. 1979, p 62

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

DOTL JC

22 302146
THE INCREDIBLE BULK
In meeting the changing needs of the bulk handling and storage user the intermediate bulk container is bridging an important gap between the small standard bag and the giant silo. In this article the author puts forward the case for a flexible approach in the movement and storage of granules and powders.

Article covered on pages 43, 45, 47, 49 and 50.

Baxter, R *Materials Handling News* No. 258, May 1979, 5 p.

ACKNOWLEDGMENT: British Railways
ORDER FROM: IPC Industrial Press Limited, 33-39 Bowling Green Lane, London EC1R ONE, England

22 302150
CALCULATION OF RUNOFF OF THE REMAINDER OF A HOT PETROLEUM PRODUCT DOWN THE WALLS OF A TANK-CAR [K raschetu stekaniya ostatka goryachego nefteprodukta so stenok zheleznodorozhnoi tsisterny]
The problem of formation of a remainder in tank-cars after discharging a warmed-up petroleum product is considered. Theoretical relations are presented for the determination of the time of runoff of a set part of petroleum product contained in the film on the inner surface of a tank-car vessel, taking temperature charges across its thickness into account. [Russian]

Mikhailov, VM (Moscow Institute of Petroleum & Gas Ind, USSR) *Izvestiia Vysshikh Uchebnykh Zavedenii, Neft i Gaz* Vol. 11 1978, pp 78-80

ACKNOWLEDGMENT: EI
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22 302153
NEW LOOK IN RAILROAD LIVESTOCK TRANSPORTATION
A new method was developed by the Union Pacific Railroad for transporting live hogs over the rails. This involves feeding, watering and resting the animals while they are in the car, avoiding stressful unloading and reloading. The successful program has enabled the railroad to remain competitive in the movement of swine.

Mundy, JF
American Society of Agricultural Engineers Paper 78-6011, 1978, 6 p.

ACKNOWLEDGMENT: EI
ORDER FROM: American Society of Agricultural Engineers, 2950 Niles Road, P.O. Box 410, St Joseph, Michigan, 49085

22 302158
A MODEL OF FREIGHT TRANSPORT SELECTION
While numerous studies have corroborated the impact of transit-time reliability on carrier selection, this paper presents some new programmable inventory-theoretic results which help unify the theory by incorporating both uncertain lead times and fluctuating demands into carrier selection and ordering decisions. An example illustrates the procedure and shows the tradeoffs between cost and transit time parameters in decision making.

Liberatore, MJ (FMC Corporation) *Transportation Journal* Vol. 18 No. 4, 1979, pp 92-100, 3 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

22 302171
CEMENT SHIPPERS FACE SEVERE RAILCAR SHORTAGES
Transportation factors and trends in rail and truck deliveries of portland cement are discussed and shown diagrammatically.

Lee Roegge, F (North American Car Corporation); Himes, S *Rock Products* Vol. 82 No. 5, May 1979, p 96

ACKNOWLEDGMENT: EI
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22 302326
WEIGHING MOVING WAGONS LOADED WITH BULK TRAFFIC AT DUNKERQUE [L'installation de pesage en mouvement du quai des pondereux de Dunkerque]
No Abstract. [French]

Oeconomos, J Porcheron, M *Revue Generale des Chemins de Fer* July 1979, pp 369-374, 1 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

22 302711
COAL TRANSPORTATION FOR SUPER THERMAL POWER STATIONS
The author discusses how India is managing the transport problems of exploiting low grade coal reserves for new power plants. Three alternative designs of coal loading station are considered, including surge bin loadout, silo loadout and static multiple point loading.

Tandon, TN *Railway Engineer International* Vol. 4 No. 3, May 1979, pp 65-66

ACKNOWLEDGMENT: EI
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22 303176
FUTURE ASPECTS OF NEW VEHICLE DISTRIBUTION FROM VW DO BRASIL
In Brazil, new motor vehicles have to be conveyed by road truck even for distances as vast as 3,000 km or more, since the railroad network is not efficient enough to handle them. However, the Brazilian government aims to extend the rail system considerably as a means of uprating the country's infrastructure, relieving the load on urban areas and reducing diesel oil consumption. VW do Brasil, as the largest industrial undertaking in the country, was requested by the Brazilian authorities to submit a draft scheme for future utilization of the railroads following their expansion and modernization. A system of 13 destination railheads was thus conceived as an initial stage. In order to calculate alternative transportation costs a special computer program was developed: with its aid movements of new vehicles from the factory to more than 800 dealers' premises were optimized. The implementation of this system would dispense with about two-thirds of the road trucks used to transport Volkswagen vehicles within Brazil, and would thus relieve the roads of 71,600,000 truck kilometers per year.

Grewe, K *Geo Journal* Vol. 3 No. 1, 1979, pp 27-34

ACKNOWLEDGMENT: EI
ORDER FROM: Akademische Verlagsgesellschaft, Postfach 1107, D-6200 Wiesbaden, West Germany

22 303182
TOTE SYSTEM
This paper presents an overall handling system for bulk cargo (powdery or liquid). It describes the features and performance of the system and how it is used. [Japanese]

Moritomo, T Oosawa, H *Furukawa Denko Jiho* Vol. 63 Feb. 1978, pp 99-106

ACKNOWLEDGMENT: EI
ORDER FROM: Furukawa Denki Kogyo K.K., 6-1, 2-Chome, Marunouchi, Chiyoda-ku, Tokyo 100, Japan

22 303605
PLANNING FOR EFFICIENT UNIT TRAIN UNLOADING
Unit trains have proven to be an excellent means for transporting bulk materials. To achieve their full potential, a rapid, efficient means of unloading must be used. Various schemes of unloading are explored with emphasis on rotary dumping of coupled cars that are automatically indexed through a rotary dumper. With this scheme, many parameters exert significant influences on the operation, such as: track plan and profile, train length and weight, cycle time, and indexer size. Proper equipment specification and advance attention to a number of site-and system-related factors will ensure a trouble-free installation. Poor choices could lead to excessive system downtime, car or track maintenance.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, New York, December 2-7, 1979.

Hansen, JA Manning, ET, Jr (McDowell-Wellman Company) American Society of Mechanical Engineers Conf Paper 79-WA/RT-7, Aug. 1979, 10 p., 12 Fig., 9 Ref., 1 App.

ORDER FROM: ESL

22 303654
ASSESSMENT OF THE COMMON CARRIER SHIPPING ENVIRONMENT
An assessment of available data and information describing the carrier shipping environment was conducted. The assessment included the major shipping hazards of shock, vibration, impact, temperature, and humidity associated with the handling, transportation, and warehousing operations of distribution cycles. Previous environmental studies and current data are reviewed and assessed for applicability to general type cargo design and/or evaluation. The data for each hazard are summarized. Hazards requiring further information and description are identified and discussed.

Ostrem, FE Godshall, WD *Forest Service General Technical Report* No. 22, 1979, 62 p.

ACKNOWLEDGMENT: EI
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22 304242
CAPABILITY OF TRANSPORTATION AND DISTRIBUTION SYSTEMS TO RESPOND TO REGIONAL GROWTH

The role of the transportation and distribution systems in regional economic growth are reviewed in light of four pending changes: (1) capital shortages, (2) fuel shortages, (3) interregional shifts in population, income, and manufacturing employment, and (4) intra-regional growth (population, industrial, and market for industrial goods growth) of small towns. The systems' ability to adapt to, as well as manage, these changes is discussed. The primary source of information is current periodical literature, such as the Transportation Journal and Business Week. Findings of the study indicate that the transportation and distribution systems can be a powerful force in economic development strategy, they can effectively stimulate regional economic growth. In addition, these resources can be instrumental in reducing demands on capital and fuel resources via more effective use of transport capacity. All economic development planning should include consideration of transportation and distribution resources.

Constantin, JA
Oklahoma University, Economic Development Administration, (EDA-OER-99-7-13344) Final Rpt. EDA/OER-79/074, Oct. 1976, 46 p.

Grant EDA-PF-536

ACKNOWLEDGMENT: NTIS
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PB-298129/8ST

22 304410
EFFECTS OF AFR STORAGE LOCATION ON SPENT FUEL TRANSPORTATION

In order to assess the impact of Away-From-Reactor (AFR) siting on the spent fuel transportation system, five different sites were studied: Argonne, Oak Ridge, Savannah River, Idaho Falls, and Richland. Transportation costs, cask fleet sizes, and radiation exposures received by transportation workers and the general public were calculated for each site. Results show that the eastern three sites are best. (ERA citation 04:042391)

ANS annual meeting, Atlanta, GA, USA, 3 Jun 1979.

Joy, DS Shappert, LB
Oak Ridge National Laboratory, Department of Energy 1979, 19 p., 5 Fig., 5 Tab.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
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CONF-790602-58

22 304498
AMERICAN FARMERS IN THE GRAIN EXPORT BUSINESS: A GUIDE TO BUYING DIRECT

At port locations, U.S. farmer cooperatives handle between one-fifth and one-fourth of total U.S. grain and oilseed exports. Grain marketing volume in 1976 totaled 64 million metric tons of which grains, oilseeds and products directly exported brought $1.4 billion. This guide indicates how to make direct contact with exporting farmers' cooperatives. It describes these cooperatives briefly and provides information on others that are part of the U.S. cooperative grain marketing system.

Bunker, AR
Department of Agriculture CIR-22, Apr. 1979, 44 p.

ACKNOWLEDGMENT: NTIS
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PB-298331/0ST

22 308441
IN-TRANSIT WIND EROSION LOSSES OF COAL AND METHOD OF CONTROL

The loss of coal and ores from open-top rail cars while in transit has been of concern for many years. Laboratory data and field tests indicate that substantial losses of valuable coal can be caused by wind erosion. Wind tunnel tests show the effects of wind velocity and particle sizing on the amount of coal lost while in transit. Different coals were evaluated to determine the variables associated with wind erosion. The erosion losses can be substantially reduced by using a binder, or crusting agent, to consolidate the surfaces of the coal into a solid mass which resists erosion.

Nimerick, KH (Dow Chemical Company); Laflin, GP *Mining Engineering* Vol. 31 No. 8, Aug. 1979, p 1236, 2 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

23 197893
BART AND METRO--RAPID TRANSIT FOR THE SAN FRANCISCO AND WASHINGTON, DC. AREAS (A BIBLIOGRAPHY WITH ABSTRACTS)
The two-section bibliography is devoted to the development of rapid rail mass transportation in two major metropolitan areas. The first section contains citations referring to BART, the San Francisco Bay area rapid transit system in California. Section two refers to the combined subway and surface transit system for the District of Columbia and outlying areas in Maryland and Virginia. Materials in both sections cover line siting, policies and planning, cars and power systems, stations and trackwork, human factors, travel patterns, and public attitudes. Attention is given to financing, revenue, maintenance, local impact, and environmental impact, as well as fare collection, noise, and legislation. Local and regional needs are discussed. (This updated bibliography contains 328 abstracts, 25 of which are new entries to the previous edition.)

Kenton, E
National Technical Information Service May 1979, 337 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTIS/PS-79/0418/8ST

23 198208
TRANSPORTATION CHANGES THROUGH 1974. SPECIAL REPORT NO. 1
A review of the data regularly monitored under the surveillance element of the continuing, comprehensive and cooperative transportation planning process is annually undertaken to provide a current picture of travel conditions in the Baltimore Region and the underlying social, economic, and developmental factors affecting travel. As part of this effort, trends and patterns in the use and performance of the transportation system are identified as are trends and patterns in regional growth. The annual review is also undertaken to assess the implications of actual changes on future travel requirements. An investigation of the reasonableness of the projected patterns of growth used in simulating travel is conducted to determine whether the forecasts are consistent with observed changes. This aspect of the review, not only illustrates the types and magnitude of travel changes that could be expected if trends continue but provides some insight as to whether modifications to the transportation plan and program are appropriate.

Sponsored in part by Maryland Dept. of Transportation, Baltimore, Federal Highway Administration, Washington, DC., and Urban Mass Transportation Washington, DC.

Kapp, C Bandy, E Dederer, C Schubert, J Breitenbach, D
Regional Planning Council, Maryland Department of Transportation, Federal Highway Administration, Urban Mass Transportation Administration BTL/RPC-76/001, Aug. 1976, 67 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-297048/1ST

23 199002
MARKET STREET WEST TRANSPORTATION STUDY
The study investigated current transit service and usage patterns. Results revealed the need for improved transit access west of 18th Street. Several alternative transit improvement proposals were developed to meet this need. After a two-stage analysis of the various transit proposals, the Study concluded that a new rapid transit station should be built to serve Market Street West on the Market/Frankford Line between the existing stations at 15th and 30th Streets. Various improvements to the subway-surface system, which is the only rail line that now penetrates the portion of the Study Area west of 18th Street, were also recommended.

Prepared for Philadelphia Dept. of Public Property, PA. Prepared in cooperation with Wallace, McHarg, Roberts and Todd, Philadelphia, PA., and Urban Engineers, Inc., Philadelphia, PA.

Simpson and Curtin, Incorporated, Philadelphia Department of Public Property, Wallace, McHarg, Roberts and Todd, Urban Engineers, Incorporated Final Rpt. UMTA-IT-09-0050-79-1, Mar. 1978, 152 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-298751/9ST

23 199013
STAGGERED WORK HOURS STUDY. DESIGN AND IMPLEMENTATION OF STAGGERED WORK HOURS IN MANHATTAN
No abstract available.
Set includes PB-298937 thru PB-298939 as RRIS 23 199014 thru 199016 respectively; Bulletin 8001.

Port Authority of New York and New Jersey, Tri-State Regional Planning Commission, Urban Mass Transportation Administration 3 Volumes, Aug. 1977, 522 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-298936-SET/ST

23 199014
STAGGERED WORK HOURS STUDY. DESIGN AND IMPLEMENTATION OF STAGGERED WORK HOURS IN MANHATTAN. VOLUME I-EXECUTIVE SUMMARY--PHASE 1
The concept of staggered work hours is a proven "low capital-intensive" method of reducing transportation congestion. Experience has shown that the staggered work hours program in Manhattan has not only reduced congestion on transportation systems, but has improved efficiency in business operations by reducing lobby congestion and improved employee attendance, punctuality and morale, all of which are additional non-cost benefits. The objective of this study was not only to further the staggered work hours program in the New York-New Jersey region, but also to determine means and methods to assist other communities in establishing their own staggered work hours program. This report, Volume I, provides a concise description of the work conducted during the study and includes the principle findings, a comparison of staggered work hours, flexible work hours, the four-day work week, and highlights the state-of-the-art of staggered work hours programs in the United States and abroad, based on a comprehensive survey of more than 200 cities throughout the world.

See also RRIS 23 199013, Bulletin 8001. Also published as Tri-State Regional Planning Commission, New York, Report No. TS-A520. Also available in set of 3 reports PC E10, PB-298 936-SET.

Port Authority of New York and New Jersey, Tri-State Regional Planning Commission, Urban Mass Transportation Administration, (UMTA-IT-09-0023/34) Final Rpt. UMTA-IT-09-0023-79-1, Aug. 1977, 73 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-298937/4ST

23 199015
STAGGERED WORK HOURS STUDY. DESIGN AND IMPLEMENTATION OF STAGGERED WORK HOURS IN MANHATTAN. VOLUME II-TECHNICAL REPORT--PHASE 1
The report, Volume II, consists of ten chapters which discuss in detail, broad categories such as the state-of-the-art survey, criteria for staggered work hours, work schedule surveys, design and implementation procedures for a successful program, transportation surveys and analysis, attitude surveys, and an evaluation of three different work schedule concepts--staggered work hours, flexible work hours, and the four-day workweek. Each chapter follows the same pattern of four major sections: objectives; work performed; analysis; and recommendations.

See also RRIS 23 199013; Bulletin 8001. Also published as Tri-State Regional Planning Commission, New York, Report No. TS-A520. Also available in set of 3 reports PC E10, PB-298 936-SET.

Port Authority of New York and New Jersey, Tri-State Regional Planning Commission, Urban Mass Transportation Administration, (UMTA-IT-09-0023/34) Final Rpt. UMTA-IT-09-0023-79-2, Aug. 1977, 415 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-298938/2ST

23 199016
STAGGERED WORK HOURS STUDY. DESIGN AND IMPLEMENTATION OF STAGGERED WORK HOURS IN MANHATTAN. VOLUME III-STAGGERED WORK HOURS MANUAL--PHASE 1
The report, Volume III, is intended to present an overall methodology for designing, implementing, and evaluating a staggered work hours program in an urban area. This volume is organized to cover the most important considerations involved in setting up a program in order to provide decision makers with the guidelines and tools necessary to first identify the need for a program, and then to promote, implement, and evaluate it.
See also RRIS 23 199013; Bulletin 8001. Also published as Tri-State Regional Planning Commission, New York, Report No. TS-A520. Also available in set of 3 reports PC E10, PB-298 936-SET.

Port Authority of New York and New Jersey, Tri-State Regional Planning Commission, Urban Mass Transportation Administration, (UMTA-IT-09-0023/34) Final Rpt. UMTA-IT-09-0023-79-3, Aug. 1977, 34 p.

ACKNOWLEDGMENT: NTIS
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23 300550
BANFIELD TRANSITWAY PROJECT
The basis for its recommendation for a light-rail transit system serving downtown Portland and its eastern suburbs is explained by the Tri-Met staff in this report. Evaluation of 5 alternatives from continuation of conventional bus service through transit lanes on expressways and separate busways to light rail are examined in terms of operating cost, capital cost, ridership, operating considerations, regional growth, community impact, downtown impact, community support and energy consumption.

Tri-County Metropolitan Transp District of Oregon Aug. 1978, 79 p., 24 Fig., 12 Tab., 4 App.

ORDER FROM: Tri-County Metropolitan Transp District of Oregon, Planning and Development Department, 4314 SE 17th Avenue, Portland, Oregon, 97202

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23 300569
NOTES ON THE COORDINATION BETWEEN PUBLIC TRANSPORT SYSTEMS IN METROPOLITAN AREAS [Appunti sul coordinamento tra sistemi di trasporto pubblico nelle aree metropolitane]
With the rapid expansion of the urban areas and the development of road transport, the transport networks have undergone nonprogrammed evolutions, which have led to the impoverishing of the level of service and to congestion. This has made necessary a reexamination of traffic currents with origin-destination surveys, which have permitted the passage to models of integrated networks, with the support of integrated tariffs and common tariffs. When the metropolitan network cannot be extended for reasons of economy and amount of traffic, the necessity arises of envisioning tramway lines with high-speed vehicles, which must cover prevalently protected itineraries. [Italian]

Liberatore, M *Ingegneria Ferroviaria* Vol. 33 No. 12, Dec. 1978, p 1051

ACKNOWLEDGMENT: EI
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23 300575
50-YEAR HISTORY OF THE SUBWAYS IN JAPAN
History of subway construction in Japan, current state of subways in large cities, history of construction methods, and new method for the subway construction are discussed.

Watanabe, T (Teito Rapid Transit Authority) *Civil Engineering in Japan* Vol. 17 1978, pp 70-85

ACKNOWLEDGMENT: EI
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23 300579
IMPROVING PERFORMANCE IN RAPID TRANSIT SYSTEMS
Recognized reliability and maintainability techniques, developed by the aerospace industry, have been modified for application to the rapid transit industry. From the evaluation of existing and proposed transit systems, it is evident that through the application of design techniques and operating strategies, the Operational Dependability can be significantly increased. Quantum improvements in the state-of-the-art are not required. However, increased cooperation between manufacturers, designers, and those responsible for specification preparation is necessary. Also, through better defined programs, more extensive testing, and inclusion of other techniques such as derating and redundancy, we should be able to provide the public with a more dependable, safe transit system while enabling the properties to maintain and operate the system more effectively.

Hunt, H (Kaiser Engineers) *ASCE Journal of Transportation Engineering* Vol. 105 No. 4, July 1979, pp 393-399, 1 Ref.

ACKNOWLEDGMENT: EI
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23 300581
THE POTENTIAL OF FEEDER BUS SYSTEMS SERVING COMMUTER RAIL STATIONS
Main objectives of this work are to develop mathematical models capable of predicting the number of commuters who would divert to rail via a feeder bus service under a wide range of alternative transport policy measures; the potential of feeder bus services to railway stations in the Crosby areas; and to analyze scale of benefits to different groups of commuters.

Leake, GR Read, M *Traffic Engineering and Control* Vol. 20 No. 2, Feb. 1979, pp 52-58, 6 Tab., 3 Phot.

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

DOTL JC

23 300583
LONDON TRANSPORT PLANS FULL ARC BY 1985
Sweeping proposals for full automation of revenue collection throughout the complex London underground network at a cost of 12.65 million pounds have been approved by the Greater London Council. The author sets out the rationale behind London Transport's decision to press ahead with a system that is being justified principally on the ground of increasing revenue through cutting fraud rather than by staff saving.

Webber, R *Railway Gazette International* Vol. 135 No. 3, Mar. 1979, pp 211-213, 4 Phot.

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

DOTL JC

23 300587
INCREASED RELIABILITY FUELS MARKET GROWTH
Strong growth in the revenue collection market has been encouraged by rapid development of microprocessor technology. In Western Europe, five national networks are installing or preparing for system-wide use of intelligent data terminals for booking office ticket issue.

Railway Gazette International Vol. 135 No. 3, Mar. 1979, pp 220-222, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
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23 300620
DETERMINATION OF TRANSIT SYSTEM DEPENDABILITY
This paper develops a passenger-based technique to calculate the overall system dependability (or, equivalently, system availability) of a rail rapid transit system, and demonstrates the technique by means of a numerical example, based on an actual transit system. The technique uses as dependability the proportion of passengers who complete their trip with no delay greater than a given tolerance limit, and takes into account dwell and blockage delays, operating policies in response to an incident, and passenger flow rates. The resulting technique is intended to tie together the various concepts of reliability, maintainability, failure modes and effects, etc., into a single measure of system performance.
Proceedings of the Annual Reliability and Maintainability Symposium, Washington, D.C., January 23-25, 1979.

Heimann, DI (Department of Transportation)

Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1429-OR, 1979, pp 314-322, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

23 300739
BREAKING DOWN THE SPEED BARRIER
The line is under construction from Combs-la-Ville, 29km south of Paris, to Sathonay, 8km north of Lyons. There will be two connections with the existing Paris-Lyons line. The first 15km branch links with the section running towards Dijon (providing a direct route to Lausanne in Switzerland); the second 6km link runs towards Savoy (providing a direct route to Geneva, in Switzerland). Length of the new line will be 389km; or, with the two connections, 410km. It has been designed for a maximum speed of 300km/h, but operating speed will be restricted to 260km/h. The existing line from Paris to Lyons has a length of 512km, and fast trains complete the journey in 3 hours 45 minutes. Distance from Paris to Lyons on the new line will be 425km, and the journey should be completed in just two hours.

Avenas, P *International Railway Journal* Mar. 1979, p 13

ACKNOWLEDGMENT: British Railways
ORDER FROM: Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013

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23 301147
THE CONTROL OF REGIONAL DEVELOPMENTS IN THE RHEIN-NECKAR CONURBATION BY THE REORGANISATION OF PUBLIC TRANSPORT [Steuerung Raumbedeutsamer Entwicklungen im Verdichtungsraum Rhein-Neckar durch Neuordnung des Oeffentlichen Personennahverkehrs]
Although the Rhein-Neckar region, with around 1.8 million inhabitants, is the sixth largest conurbation in the federal republic, it ranks much lower in terms of the quality of service offered by its public transport (OEPNV). The aim is to expand rail-bound transport in order to regulate the processes of development in the areas of ecology, housing and traffic. So far the Rhein-Neckar region has not been included in the investment programmes of federation and states with regard to transport. Therefore an attempt must be made to remedy this situation by compensatory measures. Above all the new rail construction programme of the GFR which is already under way is to be utilized by consistently taking the long-distance traffic out of the existing network in order to improve the local transport service. In addition, individual measures are to be taken to remove persistent bottlenecks. Finally, the cooperation and integration of the eight transport authorities in the Rhein-Neckar region must be brought about by organizational measures; for this purpose a public transport commission is to be appointed, to lay the foundations for a transport and tariff authority within the framework of the three-dimensional model. /TRRL/ [German]

Patschke, W *Internationales Verkehrswesen* Vol. 30 No. 2, Mar. 1978, pp 94-100, 6 Fig., 10 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307804), 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 301162
INTERNATIONAL COLLOQUIUM ON COVERAGE OF INTERMEDIATE DISTANCES [Colloque international sur la couverture des distances intermediaires]
This special issue is totally devoted to the Colloquium held in Paris on 22 and 23 November 1978, on the subject of passenger transport. It gives an account of the lectures delivered on the qualitative and quantitative aspects of demand, the place of intermediate distances in the different transport modes, estimated data and technological innovations. In most cases, the themes were dealt with by road and railway experts. Its second part aims at defining the criteria of an optimization policy to cover intermediate distances and gives the points of view expressed by Mr. Michel Feve for the roads, by Mr. Rene Lepeautre for air transport, and by Mr. Paul Gentil for the railways. [French]

Informations et Conjonctures 1979, 54 p., 30 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Informations et Conjonctures, Printing Office, 14 Boulevard Montmartre, 75009 Paris, France

23 301172
THE DB'S NEW CONCEPT FOR FAST LONG DISTANCE PASSENGER TRAFFIC [Das neue Konzept der Deutschen Bundesbahn fuer den Schienenpersonenfernverkehr]
In 20 years travel has increased sixfold in Federal Germany with little benefit to DB's passenger traffic. Market studies and comprehensive analyses have led to a new concept aiming at offering numerous fast and direct day trains on the routes the most used by 2nd class passengers. The new services are called by IC 79, and first appeared in the new timetable valid from 27 May 1979. They provide 1st and 2nd class accommodation with regular departures once an hour between 6 a.m. and 7 p.m. [German]

Wiedemann, H *Eisenbahntechnische Rundschau* Vol. 28 No. 3, Mar. 1979, pp 149-154, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, Postfach 4244, 6100 Darmstadt 1, West Germany

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23 301298
EVOLUTION OF LIGHT-RAIL TRANSIT
Social, economic, and governmental needs frequently dictate changes in the use of urban transport technology. It is the evolution of public belief and policy that most influences the development of any technology. Overdependence on petroleum fuels for transport and industrial growth has cast doubt on long-term options for continued urban life-styles and mobility. There is a need now for planning and deployment of new light-rail transit (LRT) systems. LRT, like all forms of transport, must be judged on its benefits and social costs to both users and nonusers. A look at Ghent, Hannover, Mannheim, Zurich, and Utrecht can show the transit planner how five cities have developed and used their LRT services in a manner that provides greater accessibility for all citizens as well as less direct pollution and easier adaptability to the existing urban setting. The technology of LRT is simple when innovative planning and engineering are used. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Rogers, LH (Institute of Public Administration) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 4-8, 1 Ref.

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23 301299
CURRENT TRENDS: PROBLEMS AND PROSPECTS OF LIGHT-RAIL TRANSIT
The difficult task of rescuing our urban transit systems from several decades of neglect has only started. Among the obstacles to transit improvements is our deeply rooted double standard for different types of expenditures: Purchase of wasteful items by consumers is considered to move the economy but the use of public funds, even for the construction of very useful projects, is often criticized as wasteful. Another serious obstacle to the development of rail transit in our country has been a lack of expertise in the planning, technology, and operation of these modes. We have virtually invented a new mode: unreliable rail transit. A concerted effort must be made to apply the technical skills that this technology requires to fully realize its great potential. A major step toward that goal would be made if the Urban Mass Transportation Administration would redirect some of its efforts from the development of exotic modes (some of which have little potential) toward the modernization of standard rail and bus technologies. In spite of these obstacles, light-rail transit (LRT) has recorded significant advances. It is now broadly recognized as a serious contender for major transit improvements in many medium-sized and large cities. Its modernization in Europe is continuing, new LRT systems are under construction in Canada, and several U.S. cities are actively planning or designing new LRT systems. There is also a major potential for extensive deployment of LRT In the large cities of developing countries that has not been fully recognized yet. President Carter has promised to pursue three important goals: to revitalize cities, to decrease unemployment, and to increase energy efficiency; if he takes a correct path toward these goals, we should see construction of LRT in a number of our cities in the near future. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Vuchic, VR (Pennsylvania University, Philadelphia) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 8-12, 1 Ref.

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23 301300
ISSUES IN THE IMPLEMENTATION OF LIGHT-RAIL TRANSIT
A conference on light-rail transit (LRT) invariably seems to draw out a highly explicit discussion about car design, the existence of rights-of-way for construction, and the great disparities between European advances and those in the United States. This paper suggests that, despite the high degree of competence that the technical community can claim in advocating LRT implementation, it is all little more than an academic exercise if the local, state, and national political realities are not recognized as integral aspects of implementation. The discussion in this paper is based on a survey conducted on a national scale of the key political figures in those states or areas considering LRT, as well as many key members of the agency and consulting staffs. The paper calls attention to the essential weaknesses inherent in current efforts to revitalize LRT as a primary element in urban transportation. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Leonard, GB (Los Angeles County Board of Supervisors) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 12-15

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23 301301
SAN FRANCISCO'S MUNI METRO, A LIGHT-RAIL TRANSIT SYSTEM
This paper describes improvements that are being made in San Francisco's light-rail (streetcar) transit system, the Muni Metro. The new dual-level Market Street subway accommodates Muni on the upper level and the Bay Area Rapid Transit System on the lower level. The new articulated light-rail vehicles, designed to serve the needs of both San Francisco and Boston, are described. In order to provide facilities for storage and maintenance of these vehicles, a new rail center is being constructed. The design of this facility was a particular challenge because of constraints imposed by the small size of the urban site used. Virtually all surface tracks in the city are being replaced. Muni had hoped to develop special transit rights-of-way in conjunction with the rerailing projects but encountered a political snag in the process. The power supply system that provides Muni's electrical power is unique, and the facilities it uses are also being upgraded. Finally, several route extensions contemplated by Muni are described. The new Muni Metro system is scheduled to be in full operation in late 1979. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Bei, R (San Francisco Municipal Railway) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 18-23, 3 Fig.

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23 301302
EDMONTON'S NORTHEAST LIGHT-RAIL RAPID TRANSIT LINE
Edmonton's light-rail transit (LRT) line has a total length of 7.2 km, 1.6 km of which is in subway. The line goes from the central business district (CBD) to the northeast sector of the city and uses the Canadian National Railways right-of-way. The project was approved at $65 million and is currently below estimates as well as ahead of schedule. The LRT line is the result of a balanced transportation plan that was finally adopted in 1974 to serve a city of nearly 500,000. The subway portion has two underground stations with full mezzanine floors. The mezzanine floors are part of an overall pedestrian system and connect with the basements of adjacent buildings. The subway was built to accommodate the largest standard subway car. The equipment specifications for the 14 articulated cars were based on performance and proven reliability. The construction methods used caused a minimum of interference in the CBD. Since relatively small portions were let successively, local contractors were able to use proven techniques to handle the work on a fixed-price basis. Despite the severe inflation of 1975 and 1976, costs were kept within reasonable limits. The proposed service will provide 5-min headways in the peak hour, giving a capacity of 5000 passengers/h. At midday the headway will be 10 min. The LRT line will be fully integrated with the bus transit system, and timed transfers will be provided between bus and rail. The LRT line in Edmonton makes use of available opportunities and provides the least expensive solution to the transportation problems of the northeast sector and its rapid residential development. /Authors/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

MacDonald, DL (Rapid Transit Project, Alberta, Canada); Bakker, JJ (Alberta University, Canada) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 23-27, 2 Fig.

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23 301303
CALGARY'S LIGHT-RAIL TRANSIT SYSTEM
This paper describes some of the background to the development of the South Corridor light-rail transit (LRT) line in Calgary. Characteristics of the city, the corridor, and the existing transit system are also presented. The results of a recent study undertaken to determine the type and timing of transit improvements are briefly summarized. Alternatives studied in detail included LRT, busways, and exclusive bus lanes; LRT was selected and implementation has begun. Finally, the paper describes the vehicles and route chosen.

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Kuyt, WC Hemstock, JD (Calgary, City of, Canada) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 27-32, 6 Fig., 2 Tab., 3 Ref.

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23 301304
BUFFALO'S LIGHT-RAIL RAPID TRANSIT SYSTEM
The 1976 agreement in principle by the Urban Mass Transportation Administration (UMTA) to participate in the financing of Buffalo's $336 million light-rail rapid transit (LRRT) project was the culmination of almost 10 years of planning by the Niagara Frontier Transportation Authority and the western New York community for an integrated bus and rail rapid transit system. At least 5 more years of design development and construction lie ahead. This agreement also marked the end of a lengthy, and often frustrating, alternatives analysis process that helped to guide UMTA's development of federal policy on major urban mass transit investments. Buffalo will be the first U.S. city to have a completely new rail transit project that features the advantages of light-rail technology. This paper describes the LRRT project and reports on the results of the alternatives analysis process. Comparative cost-effectiveness statistics for various transit alternatives are included in the paper. The current phase of project development (general architecture and engineering) is described, and a schedule is given for the completion of the system. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Knight, KG (Niagara Frontier Transportation Authority) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 32-38, 7 Fig., 1 Tab.

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23 301305
LIGHT-RAIL TRANSIT IN PITTSBURGH
The $228 million Early Action Program conceived by the Port Authority of Allegheny County in 1969 and funded by the local, state, and federal governments in 1970 was intended to end the seemingly endless series of biennial transit studies and begin the construction of a countywide rapid transit system on an incremental basis. It was to use various technologies, including existing trolleys, exclusive busways in the east and south, and the Transit Expressway (Skybus)--rubber-tired computer-controlled vehicles tied to an exclusive guideway--in the South Hills sector. Perhaps no rapid transit effort, especially the Transit Expressway element, has undergone as close public and technical scrutiny as has the Early Action Program. The inability to implement the program expeditiously resulted in the Urban Mass Transportation Administration's suspension of further action in the South Hills sector in October 1974. In 1975, key representatives of local and state governments as well as the Port Authority began working together to break the deadlocked argument about a fixed-guideway transit system for the South Hills corridor. An independent consultant was selected to perform the final alternatives analysis. When the South Hills alternatives analysis was completed and the recommendation of light-rail transit (LRT) technology was accepted in March 1976, a community consensus had been achieved. As a result, the Port Authority amended the Early Action Program to substitute LRT for the rubber-tired vehicles on the Transit Expressway and is proceeding with engineering and environmental impact studies with the objective of having the first stage of the LRT system operational in the South Hills sector by the Early 1980s. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Hardy, TC (Port Authority of Allegheny County, Pittsburgh) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 38-42, 3 Fig., 2 Ref.

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23 301306
LIGHT-RAIL TRANSIT: LESS CAN MEAN MORE

Perhaps the single most appealing and most useful characteristic of light-rail transit (LRT) is its inherent flexibility. Yet engineers and planners have sometimes overlooked the opportunities that accrue from this flexibility and have tried to use LRT to create a system as much like conventional rapid transit as possible at less than rapid transit's cost. This paper explores LRT's flexibility to operate in a conventional rapid transit environment, as well as its ability to not operate in a rapid transit environment. LRT is also at home in contexts more typical of the bus mode. This provides for a broad range of designs between these two extremes and allows optimal design choices to be accommodated. Design options considered in this paper include right-of-way treatment, approaches to fare collection, grade and curvature alignments, high-versus low-level platforms, signal and vehicle-protection requirements, and trade-offs between speed and capacity. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Straus, P (San Francisco Municipal Railway) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 44-49, 9 Fig., 2 Tab., 10 Ref.

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23 301307
EFFECT OF VARYING LIGHT-RAIL DESIGN STANDARDS

Light-rail transit (LRT) is a flexible transit mode that can be implemented in a variety of ways. This complicates the task of comparing it with other modes when carrying out the alternatives analysis required by the Urban Mass Transportation Administration to secure federal funding for fixed-guideway transit projects. A recent study for Santa Clara County, California, dealt with this problem by evaluating four possible variations in LRT design standards. This paper draws on the results of that study. It features a description of the study area and site conditions, a definition of the four LRT design standards considered, analysis of the different capital costs associated with each design standard, a discussion of the range of estimates of expected patronage, and a review of the resulting operating requirements and costs. The paper then presents a detailed comparison of the cumulative impact of these design differences on the cost-effectiveness measures for the bus alternatives that were also analyzed in the Santa Clara County study. It was found that, while capital cost for LRT can vary significantly according to the assumed design standard, the cost-effectiveness measures for the bus alternatives that were also analyzed in the Santa Clara County study. It was found that, while capital costs for LRT can vary significantly according to the assumed design standard, the cost-effectiveness is primarily dependent on other factors. It is therefore concluded that alternatives analysis requires the study of only one LRT design standard to establish the relative advantages and disadvantages of transit mode alternatives for a given metropolitan area. /Authors/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Kudlick, W (De Leuw, Cather and Company); Minister, RD (Santa Clara County Transportation Agency) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 49-54, 6 Tab., 2 Ref.

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23 301308
NETWORK PLANNING FOR LIGHT-RAIL TRANSIT

A common problem in the approach to light-rail transit (LRT) planning is the development and testing of less than optimal networks. This problem arises from an incomplete understanding of the application of the mode and of the opportunities inherent in its application. This paper describes how unique characteristics of LRT can be exploited by developing networks to make better use of the mode. Guidelines for network development are described and illustrated by examples. A distinction is made between techniques applicable specifically to LRT and those applicable to other transit modes. The concept of tuning a network (to match the level of investment to patronage and other benefits on a segment-by-segment basis) is presented, together with a discussion of the advantages of retaining as many future options as possible in long-range transit planning. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Fox, GD (De Leuw, Cather and Company) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 54-61, 8 Fig., 4 Ref.

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23 301309
PRE-METRO: CONVERSION NOW OR NEVER

This paper develops as a case study the 60-year experience of a light-rail transit system that was conceived as a pre-metro line with the option for eventual conversion to full metro or semi-metro status. It describes the metro features originally included and the added facilities aimed toward upgrading to metro. It explains the opportunities for full conversion that were passed by and the conflicts between incompatible regional rapid transit plans and competing rail technologies. The accumulation of factors both physical and political that finally arrested the development of this light-rail operation are laid out step by step. Forces and counterforces that acted on this system as the wider community worked slowly toward regionalization of transit are described. Special attention is given to those local community concerns that finally closed the door to metro conversion when at last the opportunity and funding to convert seemed to be available. Guidelines are developed for planners, designers, and civic and transit leaders. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Landgraf, RJ (Greater Cleveland Regional Transit Authority) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 62-67, 3 Fig., 10 Ref.

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23 301310
GOVERNMENTAL AND PUBLIC CONSTRAINTS TO THE IMPLEMENTATION OF LIGHT-RAIL TRANSIT IN DAYTON, OHIO

This paper discusses the local, state, and federal governmental and institutional constraints to the implementation of light-rail transit. The experiences of the Dayton region are used in an attempt to draw broadbased conclusions and general recommendations applicable to other medium-sized urban areas. The planning process that led to the selection of the light-rail mode in Dayton is also described. /Authors/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Jensen, JL Rude, RG (Transportation Coordinating Committee, Dayton) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 68-74

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23 301311
ANALYSIS OF TRANSIT ALTERNATIVES

The planning and implementation of major public works projects require the consideration of many engineering, social, environmental, political, and fiscal issues. In particular, the 1970s have seen nonengineering issues take precedence over engineering considerations in project planning and implementation. These issues are highlighted in a conceptual approach based on six tests of feasibility--physical, operational, institutional, social and environmental, financial, and economic feasibility. This paper describes the application of this approach and the nonengineering issues that were identified as having an effect on the planning of a light-rail transit system in Harrisburg, Pennsylvania. The feasibility tests were found to constitute a valuable approach because they lead to a formal or explicit recognition of several planning issues that are usually only implicitly recognized in planning studies. Once they were explicitly identified, these issues could be analyzed in terms of their impact on the planning process. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Hupp, RC (Southeastern Michigan Council of Governments); Weisstuch, DN (Wegman, (Leonard S.) Company, New York) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 74-82, 5 Fig., 3 Tab., 1 Ref.

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23 301312
JOINT-DEVELOPMENT POTENTIAL FOR LIGHT-RAIL SYSTEMS
In recent years, many cities have begun to question the universal application of conventional rapid transit (CRT) systems but have indicated a need for a fixed-guideway solution to their problems. During this period of technological reexamination, light-rail transit (LRT) systems are being evaluated in greater detail to determine their capacity to meet operational specifications. This paper isolates for discussion the potential of LRT systems to inspire joint-development opportunities like those that have been attributed to CRT systems. Current incentives are evaluated in terms of the similarities that exist between the development of CRT and LRT systems. LRT's operational flexibility is widely recognized. This flexibility also provides new dimensions for station-area development; the small scale (compared with CRT stations) provides opportunities for initiating development potential. The barriers to joint development for LRT systems are essentially the same as those for CRT systems. The most significant barrier to a full realization of joint-development potential is the lack of adequate private capital to realize the full opportunity of the public investment. Under the new policy directives for urban revitalization, several new financial assistance programs have been developed. The urban design action grants appear to have a significant potential for use in expanding the joint-development potential of LRT systems. Value-capture options for stimulating private investment in joint development are currently being given considerable attention in demonstrations of LRT and downtown people movers. Each rapid transit system currently under consideration must conduct an assessment of the value-capture potential as part of the requirements for federal funding. Implementation techniques are discussed in terms of development incentives and the control mechanisms that are necessary to guide development along the lines of community objectives. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Carter, SA (Carter (Stephen) and Associates) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 82-88, 1 Tab., 5 Ref.

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FORT WORTH'S PRIVATELY OWNED SUBWAY SYSTEM
For the past 14 years a small subway system has been carrying passengers into and out of the central business district (CBD) of Fort Worth, Texas. It has two unique features: It is privately owned, and passengers ride it for free. In the early 1960s, two merchants in Fort Worth hit on the idea of providing subway service to their downtown department store from a large parking lot on the banks of the nearby Trinity River. They bought second-hand electric trolley cars from Capitol Transit Company of Washington, D.C., modified them extensively, dug a tunnel from the edge of the parking lot to the lower level of their store, and began operating the subway in February 1963. Tandy Corporation bought the department store in 1967 and continued to operate the subway, which carried nearly 15,000 passengers/d. Tandy is now rebuilding the subway cars to give them a squared-off configuration and many refinements. Introduction of these refurbished cars will coincide with the opening of Tandy Center--an eight-block complex of office buildings and shopping malls in downtown Fort Worth that the subway system will serve. There has been some preliminary exploration of the feasibility of extending the subway system several blocks south through the CBD. This short-haul do-it-yourself subway system has proved that shoppers and downtown workers can be induced to leave their automobiles in a fringe parking lot and ride into the heart of the city by light-rail transit. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Scott, PD (Tandy Corporation) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 88-91

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23 301314
EVALUATIONS OF OPERATING LIGHT-RAIL TRANSIT AND STREETCAR SYSTEMS IN THE UNITED STATES
The goal of the research presented in this paper is to evaluate how closely each of the light-rail transit (LRT) and streetcar systems in the United States approaches the LRT concept. Both LRT and streetcar systems are evaluated because the usual pattern of development, here as in Europe, has been for streetcar systems to be upgraded gradually to LRT standards. Of the surviving networks, several run largely on reserved rights-of-way and closely approach the LRT concept; others are clearly street-car operations that possess few true LRT characteristics. Highlighting the strengths and weaknesses of existing systems should be helpful to those planning new LRT installations. The paper also stresses two of the most important qualities of LRT systems: (a) flexibility in right-of-way location and its concomitant, the ability to improve segments of systems on an incremental basis, and (b) ability of systems constructed in a trunk-and-branches pattern to provide both line-haul and collection and distribution functions, thus giving most patrons a single-vehicle ride. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Schumann, JW (Klauder (Louis T) and Associates) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 94-103, 10 Tab., 23 Ref.

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23 301315
OPERATIONAL IDIOSYNCRASIES OF A SUBWAY-SURFACE SYSTEM
The objectives of this paper are to acquaint the reader with the behind-the-scenes activities that constitute the day-to-day operations of Philadelphia is subway-surface system and to pinpoint techniques and methods that new systems could adopt to avoid some of the problems SEPTA faces. The paper discusses daily operations, service interruptions, training, accident prevention, and support activities. The problems discussed are accompanied by a discussion of the solutions adopted or those that would be adopted if there were adequate funds and local cooperation. Specific recommendations for new systems are summarized. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Boscia, JF (Southeastern Pennsylvania Transportation Authority) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 103-107, 2 Fig.

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23 301317
CONTROL OF LIGHT-RAIL TRANSIT OPERATIONS IN EDMONTON
The first line of Edmonton's light-rail transit (LRT) system is currently being completed. The underground portion of the line in the downtown area connects to a surface portion that shares its corridor with a major railway line. Interactions between the railway, LRT, and other transportation modes have created problems in the areas of safety, roadway capacity, and regularity of service. This paper describes the approach taken in Edmonton to overcome these problems. The new transportation management system, which is in its initial stages of implementation, is a major tool in minimizing the negative impacts of LRT. The system focuses on the establishment of LRT controls that, in addition to the categoric requirements of safety, must guarantee optimum use of the LRT tunnel, which in turn depends greatly on the regularity of service on surface portions of the LRT line, and integration with other transportation modes in terms of safety, coordination of scheduling between LRT and buses, and minimization of disruption to all modes at the nine grade crossings. In general, the flexibility of LRT operations and the implementation of an integrated transportation management system has enabled cost-effective solutions to be developed. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

O'Brien, W (Edmonton Transportation Planning Branch); Schnablegger, J (Edmonton Traffic Operations Branch); Teply, S (Alberta University, Canada) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 115-119, 8 Fig., 3 Ref.

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23 301324
INVESTIGATING THE POTENTIAL FOR STREET OPERATION OF LIGHT-RAIL TRANSIT
This paper examines the potential for light-rail transit (LRT) operations in the street with mixed traffic. It is hypothesized that street operation of LRT is possible, and in some areas desirable, for both cost reduction and service improvement. It is believed that the potential cost savings in construction

should lead planners to consider using LRT in streets. However, little work has been done in analyzing the problems associated with street operation. This paper attempts to establish a systematic framework for investigating the potential for a shared street environment and to stimulate a discussion among LRT Planners about the role of street operations in proposed systems. The methodology used in this study has two phases: the identification and investigation of the associated problems and the analysis of various design elements and strategies. Several possibilities for street operation are discussed and the generic problems of street running and traffic conflicts are analyzed. The approach is based on existing data from Toronto. /Author/

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Taber, J Lutin, J (Princeton University) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 161-166, 9 Fig., 4 Ref.

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23 301329
INTRODUCTION: LIGHT-RAIL TRANSIT: PLANNING AND TECHNOLOGY
The conference papers were presented in 5 sessions. The opening session relates accounts of light rail transit (LRT) successes in many cities. Problems and issues that have frustrated significant LRT development in the U.S. are explored in subsequent papers. A series of case studies examine where and how progress has been achieved. The basic dichotomy between socioeconomic and technological issues in the implementation of LRT is reflected in papers on such topics as network planning, joint development opportunities, and the formulation of functional specifications and fare collection, traffic engineering and power supply. The final session examines the future in the light of past experience. The session papers emphasize the overriding need to inform decision makers at all levels about the characteristics of LRT. Ignorance and bias must be removed before LRT can move forward on a broad front.

This paper appeared in TRB Special Report No. 182, Light-Rail Transit: Planning and Technology.

Taylor, SF (Sanders and Thomas, Incorporated) *Transportation Research Board Special Report* No. 182, 1978, 1 p., 1 Ref.

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23 301441
STUDY ON SHINKANSEN TRAIN TRAFFIC CONTROL-TO MAINTAIN STEADY TRAIN OPERATION
Because of the increase in train delays for the high-speed trains of the Shinkansen, studies of methods for maintaining more consistent train traffic have been studied. A computerized simulation has made it possible to evaluate the train control method, stability of traffic and ability of terminals to recover from service interruptions.

Ohtsu, A *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 2, June 1979, pp 49-56, 10 Fig., 1 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

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23 301606
LONG-RANGE TRANSPORTATION PLANNING IN SOUTHEASTERN WISCONSIN
The evolution of long-range transportation system planning at one planning agency, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), is examined. Some conclusions about the continued role of long-range planning are drawn, and some directions for further evolution of such planning are suggested. After a brief historical review of long-range transportation system planning at SEWRPC, five recent criticisms of the planning process in southeastern Wisconsin and elsewhere are identified: (a) the need for short-range emphasis; (b) an inability to deal with uncertainty; (c) disregard of fiscal constraints; (d) excessive orientation toward facilities; and (e) neglect of local plan impacts. The eight fundamental principles of transportation planning used by SEWRPC are reviewed in light of these criticisms. Although they are found to be basically sound, they are shown to require expansion to (a) include a provision for subregional planning, (b) deal with uncertainty and explain the approach taken by SEWRPC and a possible method that is under development, (c) alter the planning process to consider all alternatives including system operation and management initiatives, and (d) develop an integrated transportation planning process that effectively brings together long-range and short-range transportation system planning and programming. /Author/

This paper appeared in Transportation Research Record No. 707, Urban Transportation Planning, Evaluation and Analysis.

Schulz, DF (Southeastern Wisconsin Regional Planning Comm) *Transportation Research Record* No. 707, 1979, pp 11-16, Refs.

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DISTRIBUTION OF COMMUTER TRAFFIC (MODAL SPLIT). EXAMPLES FROM EXPERIMENTS, MODEL EVALUATIONS AND COMPUTER PROGRAMS. 2. ACTIVITY REPORT, RESEARCH PROJECT 1/72 [Verkehrsteilung (Modal Split) der Pendler. Testbeispiele, Modellansaetze und EDV-Programme. 2. Arbeitsbericht. Forschungsauftrag, 1/72.]
No Abstract. [German]

Vereinigung Schweizerischer Verkehrsingenieure 1977, 96 p., 32 Tab., 23 Phot.

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23 301831
FIRST LINE OF ATLANTA'S NEW TRANSIT SYSTEM OPENS
With lessons learned from San Francisco and Washington, D. C., Atlanta hopes to avoid some of the problems encountered by those cities in building and operating its new transit system. The first line of that system, known as MARTA for Metropolitan Atlanta Rapid Transit Authority, opens for passengers this month. When complete, the system will encompass 53 miles of rail line and 8 miles of busways served by 41 passenger stations. It is expected to provide some relief against a gasoline-starved transportation future; it will also help to revitalize parts of the deteriorating center city. Covered are facts about the subway section, elevated structures, trackwork, stations and the unique organization that designed and is building the system. Also, a sidebar article on restructuring the urban environment by planning the development of station sites is by Paul E. Potter, who worked as assistant director of design for general consultant Parsons Brinckerhoff-/Tudor.

ASCE Civil Engineering Vol. 49 No. 7, July 1979, pp 77-82

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23 301841
DYNAMIC MODELS OF COMPETITION BETWEEN TRANSPORTATION MODES
Presented is a methodology to study the choice of transportation mode. It is dynamic and allows inherent fluctuations in individual behavior to play a role. The methodology has a deterministic aspect which yields the time evolution of the number of users for a transportation mode and it is based on certain assumptions about the advantages of each mode, but it is always subject to fluctuations in human behavior. The problem then is to find the solutions of the deterministic equations describing the system and to examine the evolutionary path the system will take. Two models of competition between transportation-mode choice are developed to illustrate the methodology and to justify the dynamic approach to travel choice. /Author/TRRL/

Deneubourg, JL (Universite Libre de Brussels, Belgium); Khan, D (Department of Transportation) *Environment and Planning A* Vol. 11 No. 6, June 1979, pp 665-673, 9 Fig., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241468)
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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) *Logistics and Transportation Review* Vol. 15 No. 2, 1979, pp 335-358, 1 Fig., 1 Tab., 30 Ref.

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23 302168
RAILVIEW: A REBIRTH OF PASSENGER CAR MANUFACTURING?
Amtrak's president describes trends that he feels will create an increasing demand for new passenger cars and called for reestablishment of a major rail-car manufacturing capability in the U.S. Growing energy costs and prospects for coordination of public transport modes offer the prospect that rail passenger travel will increase.

Boyd, AS (Amtrak) *Railway Age* Vol. 180 No. 17, Sept. 1979, pp 94-97, 1 Phot.

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23 302173
URBAN TRANSPORTATION PLANNING IN TRANSITION: THE SOURCES AND PROSPECTS OF TSM
A recent federal transportation policy initiative has encouraged metropolitan and local transportation planners to place increased emphasis on near-term, service-oriented transportation problems. This policy, called Transportation System Management (TSM), was designed to affect not only the types of projects to be considered during the planning process, but also the institutional framework established to conduct and guide comprehensive transportation planning. A description is given of the emergence of TSM-type planning from a tradition of large-scale, facility-oriented planning. Characteristics of the TSM program that may significantly affect the process and politics of transportation planning are discussed. The characteristics of TSM program performance and their likely effect on transportation planning in general are identified. These include the greater emphasis on short-range actions and the need to resolve apparent conflicts between efficiency and amenity objectives.

Gakenheimer, R (Massachusetts Institute of Technology); Meyer, M *Journal of the American Planning Association* Vol. 45 No. 1, Jan. 1979, pp 28-35, 13 Ref.

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23 302186
TRAIN-TO-PLANE LINKS MANHATTAN AND JFK
The author discusses the premium rapid transit service which uses existing trackage and stations; ties into bus service to various terminals at Kennedy International Airport in New York City.

Galler, S *Public Works* Vol. 110 No. 6, June 1979, pp 74-75

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23 302241
IMPACT OF POPULATION AND ENERGY ON TRANSPORTATION NEEDS: MULTIMODAL APPROACH
This paper documents a computer process developed to explore the potential diversion of automobile trips by purpose and length for various population growths and energy futures and the impact this diversion will have on transportation needs. The technique is a straightforward method of using the existing statewide transportation model to generate statewide highway trip tables for each possible future. There tables are split by trip purpose based on analysis of actual statewide origin-destination data and then split into modes based on trip purpose and length information gained in the survey of air, rail, and bus travel characteristics. Information on the modal split in other mass transit corridors in the United States is also used as a guide. The variables in this process are easily understood and thus may be quickly adjusted to reevaluate transportation needs and to reflect various planning policies. Once the modal trip tables are generated, they are assigned to a statewide air, rail, or bus network based on station accessibility; the remaining trips are assigned to the highway network. The end product is a computer plot that shows the potential travel volumes by mode and the probable impact of each population growth and energy future on state highway needs. This technique is being applied in rural portions of 13 of Michigan's 14 planning regions. /Author/

This paper appeared in TRB Record No. 710, Current Issues in Statewide Transportation Planning.

Newell, J Esch, RE (Michigan Department of Transportation) *Transportation Research Record* No. 710, 1979, pp 19-26, 3 Fig., 3 Tab., 4 Ref.

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23 302264
PROCEEDINGS OF THE THIRD UMTA R&D PRIORITIES CONFERENCE, CAMBRIDGE, MASSACHUSETTS, NOVEMBER 1978. VOLUME V: UMTA SPECIAL TECHNOLOGY PROGRAMS WORKSHOPS
This is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshops on UMTA Special Technology Programs. Part I deals with safety, qualification, and life-cycle costing, and includes discussions of rail transit safety and product qualification. Part II--consumer inquiry technology, National Cooperative Transit R&D Program, and technology program--includes discussions of consumer need for information on transit availability, the National Cooperative Transit R&D Program (NCTRP), the technology sharing program, and transit marketing. This volume contains six resource papers which can be found summarized in Volume I of this report along with summaries of other workshop sessions. Volume I also includes the proceedings of the general sessions and a listing of conference participants. These proceedings (Rpt. Nos. UMTA-DC-06-0157-79-1 thru UMTA-DC-06-0157-79-9) consist of nine separately titled volumes, namely: Volume I: Proceedings of General Sessions and Summarized Reports of Workshops; Volume II: Bus and Paratransit Technology Workshops; Volume III: AGT and Advanced Systems Workshops; Volume IV: Service and Methods Demonstration Workshops; Volume V: UMTA Special Technology Programs Workshops; Volume VI: Rail and Construction Technology; Volume VII: Transit Management Workshops; Volume VIII: Access for Elderly and Handicapped Persons Workshops; and Volume IX: Urban Transportation Planning Workshop.

This report is a sequel to reports: Proceedings of the UMTA/APTA R&D Priorities Conference, February 1978 (PB 255-898); and Proceedings of the Second R&D Priorities Conference, December 1976 (PB 266-158).

American Public Transit Association, Urban Mass Transportation Administration, (DC-06-0157) UMTA-DC-06-0157-79-5, Nov. 1978, 75 p.

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23 302349
A TECHNOLOGY ASSESSMENT OF TRANSPORTATION SYSTEMS DESIGN IN THREE CASE STUDY COMMUNITIES
Described is a method of technology assessment capable of evaluating transportation alternatives for a variety of city sizes, land-use patterns and socioeconomic characteristics. It is an abstract technology assessment format capable of generic evaluation over a hierarchy of city sizes, shapes and modal transportation technology characteristics using unit cost and impact data. A research agency is able to rapidly examine sensitivities and boundaries of rational or optimal transportation investments. This examination may occur over a group of similar or different regions and may draw significant conclusions about the mix of transportation technology investments most likely needed and capable of compatible operation.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Haefner, LE Hutchins, L Lang, D Meyer, R Yarjani, B (Washington University, St Louis)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 205-212, 5 Tab.

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23 302358
NORTHEAST CORRIDOR RAIL PASSENGER TRANSPORTATION: MODELING THE FUTURE
The Northeast Corridor Project Office in FRA/DOT has been using a multi-modal disaggregate demand forecasting model (NDM). The methodology covers air, bus, auto and rail with the Northeast Corridor region broken into ten urban areas. NDM, in addition to having the usual input and output modules, has a transportation system simulator for modal choice of individual travelers and a total transportation demand submodel which forecasts total intercity trips by all modes. Results have illustrated a range of possible future rail passenger demands in NEC after the system improvements are completed. Such modeling provides a range of reasonably confident futures and illustrates the possible magnitude of changes in one or more variables upon future forecasts.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Gantzer, DJ (Department of Energy)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 331-338, 4 Fig., 9 Ref.

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23 302359
A PLANNING APPROACH TO ESTIMATING THE IMPACTS OF CAPACITY CONSTRAINTS ON INTERCITY RAIL PATRONAGE AND REVENUES
As part of the planning for restructure of the Amtrak system, empirically based analytical techniques were developed to assess the impact of route specific capacity constraints on intercity rail patronage and revenues. These methods were needed to determine whether sufficient train capacity would be provided on routes where patronage would be expected to increase because of discontinued trains, shorter trains, introduction of new equipment of different design and projected future growth in patronage. FRA data on passenger volumes and seasonal variations were the basis for this methodology. The techniques provide key rations of seat-miles to passenger-miles needed to carry all passengers and enables management to estimate the marginal number of seat-miles required to carry an additional passenger. The analysis also has been used to determine fare levels for maximizing revenues on routes subject to capacity constraint.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Prokopy, JC Schueftan, O (Peat, Marwick, Mitchell and Company)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 339-345

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23 302378
REPORT OF THE THIRTY-FIFTH ROUND TABLE ON TRANSPORT ECONOMICS HELD IN PARIS ON 28TH AND 29TH OCTOBER 1976 ON THE FOLLOWING TOPIC: ORGANISATION OF REGIONAL PASSENGER TRANSPORT
This paper was presented as a basis for discussion among transport economists taking part in a round table on transport economics organised by the European Conference of Ministers of Transport. The author advanced a number of theses, related to regional transport needs, the organisation of undertakings, the role of the authorities, regular special-purpose services, the function of national railways, intermediate modes of transport and fares. A summary of the discussion is presented, which concluded that in many cases, the methods of providing transport needed to be revised, and that the money spent on running scheduled services would often suffice to finance a system which was more individualised and better suited to meet demand. A list of participants to the round table is appended. (TRRL)

Ruehl, A
European Conference of Ministers of Transport Monograph No. 35, 1977, 40 p.

ACKNOWLEDGMENT: TRRL (IRRD 241853)
ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006
P7905059

23 302380
THE CHOICE OF ROUTE, MODE, ORIGIN AND DESTINATION BY CALCULATION AND SIMULATION
People have to make choices when they make trips. The choices may be of destination, of mode of travel, of route or of time. The report describes a simple method of calculating the assignment of trips where travellers are free to choose between alternatives. The method of calculation is called "scata" (simple choice algorithm for trip assignment) and is derived from the assumption that travellers vary in their perception of the costs and benefits of the alternatives and choose whichever is best for them. The use of scata is illustrated by examples that cover choice of route, of mode and of origin and destination. The theoretical accuracy of scata is assessed by comparing the assignments with those predicted by a simulation that is based upon the same fundamental assumptions. It is thought that scata may be of use in the design of traffic management schemes. For this purpose, the scata method of assignment must be joined to a model that predicts trip costs as a function of the assignment. An example is given that shows some of the implications that follow when scata is used in this way. (TRRL)

Robertson, DI Kennedy, JV
Transport and Road Research Laboratory, (0305-1293) Monograph TRRL Lab Rpt LR 877, 1979, 30 p., 9 Fig., 6 Tab., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242042)
ORDER FROM: TRRL

23 302383
THE RIO DE JANEIRO SUBWAY SYSTEM-A CASE STUDY IN APPLYING THEORY TO PRACTICE
A case study of translation of theoretical developments (Friedman, 1975; 1976) to implementation procedures is outlined with specific reference to the Rio de Janeiro subway system. Within the overall framework of establishing the time schedule of trips of a single line that minimizes the average waiting time of passengers with possible generalization and extension to multi-line network, the present manuscript has the limited aim of developing a time table and determining the minimal number of trains required to keep up a given schedule of trips of a single line. The incorporation of a new ad-hoc procedure of "inclusion and exclusion trips" to and from an intermediate regulating station is a novel feature not included in the original Friedman model. This supplement characterizes an important physical attribute of the Rio de Janeiro system, namely, the limited train storage capacity at the terminal stations which is offset by virtual unlimited storage capacity at the intermediate regulating station. The case study has generated a procedure for creation and manipulation of large data bases in real life applications encountering practical constraints using a theoretically sound set of efficient algorithms.

Friedman, M (Arizona State University, Tempe); Cordovil, CAG (IBM Brazil) *Transportation Research. Part A: General* Vol. 13A No. 2, Apr. 1979, pp 125-134, 1 Fig., 2 Tab., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242473)
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

23 302384
A PLANNING MODEL FOR PHASING IN A NEW FLEET OF LIGHT RAIL VEHICLES
This paper describes a computerized planning model developed to assist the operations planning groups of urban transportation systems. The model is to be utilized in planning the phasing in a fleet of new light rail vehicles (lrvs). The model consists of a system of interrelated, calibrated mathematical functions following iterative procedures to meet specified tolerances. Applications of the model are given within the context of the Massachusetts Bay Transportation Authority. The experimental investigations include: the impact of the lrvs on ridership demand, operating costs, revenues and on operating performance measures. Additionally, assignment rules for allocating arriving lrvs are evaluated. The experimental results show that the "best" assignment rule changes as a function of the number of lrvs available. In

addition, the results show that following the introduction of the lrvs, "economies of scale" can be expected. The model is written in FORTRAN and consists of ten modules, the main routine and nine sub-routines.

Maggard, MJ Marcotte, AA Chang, YS (Boston University); Glickman, TS (Department of Transportation) *Transportation Research. Part A: General* Vol. 13A No. 2, Apr. 1979, pp 83-90, 8 Fig., 1 Tab., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242471)
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

23 302389
RAILWAYS INTO BUSWAYS WONT GO. A RE-EXAMINATION OF TWO CASE STUDIES
Reference is made to a 1976 publication entitled "Better Use of Rail Ways" which reported an evaluation of six case studies related to the conversion of existing rail links into general purpose roads. In this discussion paper the authors present a re-examination of two of the original six case studies in order to assess the validity of the assumptions and costings used in the 1976 study, and where found necessary to change them. The two cases described relate to the Crouch Valley line-a single track route linking Southminster and Wickford Station of the Southend to London main line; and the Colchester-Sudbury line on the Colchester-Liverpool Street main line. The economic evaluation and assessment of costs for each study is discussed, and traffic data are provided in a series of appendices. Economic rates of return are reported of 2.9 per cent and 1.6 per cent respectively, in contrast to values of 60 per cent and 30 per cent respectively quoted in the 1976 study. The reason for the marked contrast between the two findings is discussed, and on the basis of the new evidence the conclusion is reached that railway conversion into roads does not provide a general solution to the perennial problem of railway finance.

Cooper, JC Spaven, DL
Polytechnic of Central London Monograph Mar. 1977, 52 p., 8 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 241842)
ORDER FROM: Polytechnic of Central London, Transport Studies Group, 35 Marylebone Road, London NW1, England

P7903011

23 302693
FROM CABLE DRIVE TO COMPUTER CONTROL--GLASGOW'S 83-YEAR-OLD SUBWAY GETS REBUILT
The Glasgow underground resumes operation after a complete modernization of its track, rolling stock, communications and signals, stations and maintenance facilities. Greater Glasgow Passenger Transport Executive closed down its 10-mile subway loop for 2 1/2 years for complete rehabilitation of facilities which initially opened for service 83 years ago.

Transportation Research News No. 84, Sept. 1979, pp 6-10, 6 Phot.

ORDER FROM: TRB Publications Off

23 303202
MECHANISM OF CROSS PASSENGER FLOW IN RAILWAY STATION
The study described was conducted to investigate the mechanism and nature of complicated passenger flow. As a first step of the study, the mechanism of cross flow is investigated by the observations at a concourse of a commuting train station in Tokyo, Japan and by a study on a mechanism model on the other hand.

Naka, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 20 No. 1, Mar. 1979, pp 15-21

ACKNOWLEDGMENT: EI
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DOTL JC

23 303204
SIMULATORS USED BY WMATA
The Washington Metropolitan Area Transit Authority rail transit system utilizes computer technology in many areas. Simulation is used in day to day operations of Metro. A train movement simulator is presently used to assist in calculating schedules and to minimize delay causing conflicts at locations where trains vie for the same track. In the future this simulator may be utilized to verify strategies and parameters used by the automatic train supervision system and the central control supervisors to control schedule disruptions. Brief descriptions are given of the Train Movement/Transit System Simulator, the Simulation of Operations Program (SOP) used to verify the Central Control Computer System software and the circuit simulator which is a program design to check the operation of interlocking circuits.

IEEE Vehicle Technology Conference, 29th, Conference Record of Papers, Arlington Heights, Illinois, March 27-30, 1979.

Lukes, M (Washington Metropolitan Area Transit Authority)
Institute of Electrical and Electronics Engineers Conf Paper IEEE 79CH1378-9VT, 1979, pp 190-191

ACKNOWLEDGMENT: EI
ORDER FROM: IEEE

23 303207
DEVELOPMENT OF THE SHINKANSEN TRAIN TRAFFIC SIMULATOR
To study traffic stability problems on the Shinkansen, the JNR Railway Technical Research Institute developed the Shinkansen Train Traffic Simulator (STRATS). The STRATS has been designed as a general-purpose system which will permit the simulation of train traffic on all the Shinkansen lines inclusive of those now planned for construction. In this system the train movements are governed by train arrival and departure times, track numbers at stations etc., as prescribed in the predetermined train schedule.

Ohtsu, A (Japanese National Railways) *Japanese Railway Engineering* Vol. 18 No. 3, 1978, pp 6-7

ACKNOWLEDGMENT: EI
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23 303581
BART: THE ROAD IS STILL BUMPY, BUT THE GOAL IS IN SIGHT
While its most protracted labor dispute was taking place, Bay Area Rapid Transit was actively working to improve reliability, safety and capacity. In the wake of its tunnel fire, BART is investigating new types of seat upholstery and ways to inhibit the spread of flames and smoke in its cars and tunnels. Improvements in brake and traction components are to increase car availability. A Sequential Occupancy Release System is to supplement the original automatic train control to permit closer headways and cab signals will permit full-speed operation in cases of some central control failures. Fare-gates are also being improved. Ahead will be additional track capacity and new computers which will be adjuncts to a completely new control system.

Middleton, WD *Railway Age* Vol. 180 No. 21, Nov. 1979, p 28, 4 Phot.

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DOTL JC

23 303597
THE EDMONTON-CALGARY CORRIDOR TRANSPORTATION STUDY
The Edmonton-Calgary corridor transportation study is an example of multimodal intercity passenger transportation planning in low density corridor. This paper discusses a number of unique approaches used in the study that were the result of the need to deal with the low-density aspects, the need to consider both regional and inter-city travel, and the inherent design of the study. These include its iterative approach to the analysis, its handling of the demand and cost analysis, its consideration of multimodal impacts, and the emphasis on identifying key issues and resulting strategic choices. The success and drawbacks of these methodologies are reviewed. The paper also reviews the major findings of the study, many of which can be extended to a more general context: a competitive market analysis may be of little interest in low-density regions; new technologies tend to bias even further the imbalance between intercity and regional transportation service; the automobile has a key role to play in regional transportation; for many transportation needs the intercity bus is an economical and efficient mode; and an improved rail service is an uncertain and long-term venture, which could detrimentally affect all intercity bus service in the region.

Mayne, JW (Treasury Board, Government of Canada); Morrall, JF (Calgary University, Canada) *Canadian Journal of Civil Engineering* Vol. 6 No. 2, June 1979, pp 208-220, 3 Fig., 1 Tab., 10 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242574), Roads and Transportation Association of Canada
ORDER FROM: ESL

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23 303635
ECONOMIC EVALUATION OF TIME SPENT IN TRAVEL
[Valutazione economica del tempo nei trasporti]
The writer of the article attempts to give a value to time, so as to determine the fares or supplements to be charged for high-speed railway services, taking into account the limits imposed by competition between the various passenger transport modes. [Italian]

Vannutelli, R *Ingegneria Ferroviaria* Vol. 34 No. 6, June 1979, pp 429-434, 3 Phot.

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

DOTL JC

23 303656
BRITAIN'S MOST UNUSUAL METRO NEARS COMPLETION
The public transport system nearing completion in the United Kingdom's northeast capital of Newcastle-on-Tyne is described. The design features a rapid transit light rail system using electrically-powered Supertrams.

Stoddart, S *World Construction* Vol. 32 No. 7, July 1979, p 79

ACKNOWLEDGMENT: EI
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DOTL JC

23 303659
COMPUTATION OF OPTIMAL CONTROL LIMITS FOR A QUEUE WITH BATCH SERVICES
A study is made of the optimal control of a queueing system with Poisson input and a server capable of serving an infinite number of customers per batch. It is known that the optimal type of control policy is a control limit policy: service should begin if and only if the number of waiting customers is at least as large as some control limit. The objective is to find the control limit that minimizes the long run average cost of waiting and service charges. A determination is made of the cost as a function of the control limit, present properties of the cost function and optimal control limit, present easily computable upper and lower bounds for the optimal control limit and an algorithm for finding the optimal control limit. This work is pertinent to mass transit.

Weiss, HJ (Temple University) *Management Science* Vol. 25 Apr. 1979, pp 320-328, 8 Ref.

ACKNOWLEDGMENT: EI
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23 303856
TYNE AND WEAR PUBLIC TRANSPORT IMPACT STUDY: STUDY DEFINITION REPORT
This report defines the content and method of a study of the effects of the introduction of the Tyne and Wear Metro and the reorganisation of bus services to complement the Metro and provide an integrated public transport system. The aim of the study is to identify and quantify the effects of changes in the public transport system on travel behaviour, activities and land use in the area concerned. The results of the study are intended to assist Central Government in future decisions on policy towards the public transport, the Tyne and Wear County Council in transport and land use planning and expenditure decisions within the County, the Tyne and Wear PTE with operating and marketing aspects of the system, the District Councils within the County when considering land use planning and development decisions, and transport planners for local authorities elsewhere in the UK by providing information on the effects of improvements to public transport. The statistical reliability of the study is discussed: overall, it is hoped to detect changes in major factors (such as public transport trip rate) of 10 per cent with a confidence of at least 90 per cent.
Prepared in cooperation with the Tyne and Wear County Council.

Transport and Road Research Laboratory Suppl Rpt. No. 478, 1979, 21 p., 5 Fig.

ACKNOWLEDGMENT: British Railways
ORDER FROM: TRRL

23 304686
PROCEEDINGS OF THE UMTA R AND D PRIORITIES CONFERENCE (3RD) HELD AT CAMBRIDGE, MA., ON NOVEMBER 16-17, 1978. VOLUME VI: RAIL AND CONSTRUCTION TECHNOLOGY WORKSHOPS
The document is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshops on Rail and Construction Technology. Part I deals with railcars and equipment and includes discussions of the rail technology R&D program, the rail system studies of the Congressional Office of Technology Assessment, and the problems connected with technology deployment. Part II, construction technologies, includes discussions of construction technologies and costs and the transit industry's views of UMTA's R&D program in this area. This volume contains five resource papers which can be found summarized in Volume I of this report along with summaries of other workshop sessions. Volume I also includes the proceedings of the general sessions and a listing of conference participants.
See also Volume 5, PB-300990, and Volume 7, PB-300992.

American Public Transit Association, Urban Mass Transportation Administration, (UMTA-DC-06-0157) UMTA-DC-06-0157-79-6, Nov. 1978, 56 p.

Contract DOT-UT-70026

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-300991/7ST

23 304707
URBAN RAPID RAIL VEHICLE AND SYSTEMS PROGRAM. ANNUAL REPORT
The report reviews the seventh year's efforts of the Urban Mass Transportation Administration (UMTA) Urban Rail Vehicle and Systems Program. It describes the work accomplished and summarizes pertinent technical and design data. The objective of the Program is to enhance the attractiveness of rail rapid transit to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe, and economical as possible. Three major hardware tasks were active during this reporting period, namely: the State-of-the-Art Cars (SOAC), the Advanced Concept Train (ACT-1), and the Advanced Subsystem Development Program (ASD).
See also PB-295124.

Boeing Vertol Company, Urban Mass Transportation Administration, (UMTA-IT-06-0026) D174-10052-1, UMTA-IT-06-0026-79-4, Oct. 1978, 99 p.

Contract DOT-UT-10007

ACKNOWLEDGMENT: NTIS
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PB-301168/1ST

23 304716
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS: A HANDBOOK FOR TRANSPORTATION PLANNERS
The report consists of a handbook to be used by transportation planners and urban specialists for estimating system parameters for conventional transportation technology. Three modes are evaluated: rail transit, local bus and bus rapid transit, and highway systems. Each mode contains an assessment of the following seven selected supply parameters: speed, capacity, operating cost, energy consumption, pollutant emissions, capital costs, and accident frequency. These parameters are organized as proxy variables in describing the characteristics of each transport mode.
Sponsored in part by Federal Highway Administration, Washington, DC. Prepared in cooperation with Urban Inst., Washington, DC. Supersedes PB-245 809. See also PB-293220.

Sanders, DB Reynen, TA
De Leuw, Cather and Company, Urban Mass Transportation Administration, Federal Highway Administration, (UMTA-IT-06-0049) Final Rpt. UMTA-IT-06-0049-79-3, June 1979, 194 p.

Contract DOT-UT-20019

ACKNOWLEDGMENT: NTIS
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PB-301319/0ST

23 304720
TRANSIT CORRIDOR ANALYSIS-A MANUAL SKETCH PLANNING TECHNIQUE
This is a user's handbook. It describes a sketch planning technique for quick first evaluations of urban transportation planning proposals--a manual technique which does not require computers. It presents the technique's computational steps, which rely heavily on graphic aids, in an orderly manner and minute detail. The technique is useful in the analysis of short and long range plans for urban line-haul transit systems. The manual technique does not provide a single, definitive solution, but it can provide, for each system, alternative measures of demand, performance (cost and travel times), and impact to help local decision making. The technique has three modular phases: demand estimate, cost analysis, and impact analysis. It is also modular within the phases, since the user is free at many points to substitute his own data or analytical techniques and to substitute local estimates for the default values supplied. This book has four divisions. The introduction describes the purposes and uses of the technique. The second chapter, an overview, discusses general parameters and assumptions, and identifies those situations in which the technique can be applied. The third chapter describes the method and computation procedures and gives examples of each step of the procedures as applied to a sample problem. The appendices contain nomographs and blank work sheets which can, at the user's option, be used to make some of the calculations.

Prepared in cooperation with De Leuw, Cather and Co., Washington, DC., Voorhees (Alan M.) and Associates, Inc., McLean, VA., and Pratt (R. H.) Associates, Inc., Washington, DC.

Carter, MM Watkins, RH O'Doherty, JD Iwabuchi, M Schultz, GW
Comsis Corporation, Urban Mass Transportation Administration, (UM-TA-MD-06-0046) Final Rpt. UMTA-MD-06-0046-79-1, Apr. 1979, 207 p.

ACKNOWLEDGMENT: NTIS
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PB-301378/6ST

23 304723
DEVELOPMENT OF RESEARCH IN THE CONSTRUCTION OF TRANSPORTATION FACILITIES: A STUDY OF NEEDS, OBJECTIVES, RESOURCES, AND MECHANISMS FOR IMPLEMENTATION
This second-year report concentrates on two topics related to the subject matter of the study. One concerns the implementation of research results and innovative techniques. Incentives and obstacles to such implementation are identified. Proposals for more rapid and effective application of research results are made. Increased utilization of demonstration projects, bid alternates, turnkey contracts, and follow-up measures are discussed. A special study of measures by the Japanese construction industry to achieve cost reduction through innovation is included. The second topic concerns problems created by early planning, design, and organizational decisions. Experience originating in current or recent projects such as BART, WMATA, and MARTA is examined to identify such problems that have serious impact both on costs and the environment desirable for innovative efforts. This second-year report concludes with a number of recommendations that the researchers believe could be beneficial in achieving needed improvements in both topic areas.

See also report dated Sep 77, PB-277419.

Fondahl, JW Paulson, BC, Jr
Stanford University, Department of Transportation Final Rpt. DOT/R-SPA/DPB/50-7912, Aug. 1979, 146 p.
Contract DOT-OS-60150

ACKNOWLEDGMENT: NTIS
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PB-301389/3ST, DOTL NTIS

23 304761
LIGHT RAIL TRANSIT: STATE-OF-THE-ART OVERVIEW
This document presents an overview of light rail transit, an urban transit alternative which has the potential to help fill the need for flexibility in public transportation. Existing and proposed U.S. and Canadian light rail transit systems are described with a historical perspective. The technical components and service characteristics of this mode are analyzed. The document also deals with a number of planning and implementation issues, including economics of operation, and various environmental and social concerns.
Transportation Systems Center Final Rpt. DOT-TSC-OST-79-4, May 1977, 82 p.

ACKNOWLEDGMENT: NTIS
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PB80-103641, DOTL NTIS

23 307666
QUICK AND CHEAP...LRT AS IT SHOULD BE DONE
By July, 1981 San Diego expects to be operating a 26 km light rail line. Contracts for rolling stock and track materials have already been let, and bids are now being called for signalling and automatic revenue collection equipment.

Railway Gazette International Vol. 135 No. 10, Oct. 1979, 2 p., 3 Fig.

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

DOTL JC

23 308283
STUDIES ON THE POSSIBILITIES OF USE AND LIMITATIONS OF RAIL TRANSPORT AS A MEANS OF ACCESS TO AIRPORTS [Untersuchungen ueber die Einsatzmoeglichkeiten und Grenzen des Schienenverkehrs als Zubringer zu Flughaefen]
Means of access should not only be studied as short-distance, but also as long-distance transport. The report makes a general comparison between rail links and other transport modes, to assess the importance of the railway and the most favourable areas for its application. [German]

Beling, R *Schriftenreihe Inst f Verkehr, Eisenb u Verkehrss* No. 20, DB:Dok 5034, 1979, 259 p., 23 Tab., 81 Phot., 62 Ref., 5 App.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Technical University of Braunschweig, West Germany, Pockelstrasse 14, D-3300 Braunschweig, West Germany

23 308287
HISTORY AND PROSPECTS OF THE SHINKANSEN RAILWAY
The Shinkansen at present totals 1069km of line from Tokyo to Hakata. Two new lines, the Tohoku and Joetsu Shinkansen, are now being built. This article describes how the Tokaido Shinkansen was constructed, how efficient the network has become, various improvements made after putting the line in service and methods of maintaining equipment and installations. It then studies future prospects for other super-rapid railway lines to compete with other transport modes.

Takiyama, M *Japanese Railway Engineering* Vol. 19 No. 2, 1979, pp 4-6, 1 Fig., 1 Phot.

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

DOTL JC

24 172096
NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT
This report is a summary of selected national transportation statistics from a wide variety of government and private sources. Included are cost, inventory, and performance data describing the passenger and cargo operations of the following modes: air carrier, general aviation, automobile, bus, truck, local transit, rail, water, oil pipeline, and gas pipeline. The report includes basic descriptors of U.S. transportation, such as operating revenues and expenses, number of vehicles and employees, vehicle-miles and passenger miles, etc. A supplementary section includes Transportation and the Economy and Energy in Transportation. Energy in Transportation is divided into three parts: Energy Consumption, Energy Transport, and Energy Supply and Demand.

Transportation Systems Center No Date, n.p.

ACKNOWLEDGMENT: DOT
ORDER FROM: TSC

24 197707
THE U.S. RAILROADS: SOME ALTERNATIVES FOR IMPROVEMENT
There are numerous strategies for improving railroad performance within the industry as it is currently structured. Although no single approach will solve all of the industry's financial problems, a combination of strategies, followed simultaneously, could achieve this goal. The report, which was undertaken as part of the Section 901 studies required by the Railroad Revitalization and Regulatory Reform Act of 1976, investigates such strategies as better car distribution, lower labor costs, reduced circuitry, and improved yard efficiency. The report presents two screening models that can be used to test a wide variety of improvement strategies. Sensitivity analyses of the most promising strategies are presented for the national system, the Eastern, Southern and Western districts, and four individual railroads. Complete documentation and user's/programmer's manuals are included for each model.

Sussman, JM Martland, CD Juster, RD Kruger, JA Michaels, L
Multisystems, Incorporated, Federal Railroad Administration Final Rpt. FRA/OPPD-79/2, Nov. 1977, 373 p.

Contract DOT-FR-757-5266

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-295793/4ST, DOTL NTIS

24 198442
THE MARKET FOR RAILROAD TRANSPORTATION EQUIPMENT IN ZAIRE
The market research was undertaken to study the present and potential US share of the market in Zaire for railroad transportation equipment; to examine growth trends in Zairian end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques which are likely to succeed in Zaire were also reviewed.

U.S. sales only for 8 months. Available to foreign addressees in Feb 80.

American Embassy, Industry and Trade Administration Apr. 1979, 20 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
DIB-79-07-510

24 198443
INDIA MARKET RESEARCH REPORT ON RAILROAD EQUIPMENT
The market research was undertaken to study the present and potential US share of the market in India for railroad equipment; to examine growth trends in Indian end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques which are likely to succeed in India were also reviewed.

U.S. sales only for 8 months. Available to foreign addressees in Mar 80.

Rangaraj, V Monie, KS
American Consulate General, Industry and Trade Administration Apr. 1979, 91 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
DIB-79-08-503

24 198485
LINEAR PROGRAMMING IN MANAGEMENT (A BIBLIOGRAPHY WITH ABSTRACTS)
Government-sponsored research reports concerning linear programming as an aid to the management decision making process are cited. Models are included in the bibliography for various management situations in different industries. (This updated bibliography contains 100 abstracts, 20 of which are new entries to the previous edition.)

Jones, J
National Technical Information Service July 1979, 106 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTIS/PS-79/0634/0ST

24 198749
THE PRODUCTIVITY AND EFFICIENCY OF INPUTS IN THE PROVISION OF TRANSPORTATION SERVICES OF THE SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY
The project was developed as part of a larger program of research, namely, a study of human resource development in the Southeastern Pennsylvania Transportation Authority. The objectives of this paper are to express some elementary theory (appendix) about productivity, efficiency, and performance standards so that the case study of SEPTA has a basis in accepted theory. Simple concepts are developed which underlie the understanding of the analysis of the SEPTA system. The paper empirically examines the performance of SEPTA vis a vis other transit operations in the United States and Canada (the peer group) on the basis of a number of performance measures. In addition, more complex comparisons are made by statistical techniques. The major insight gleaned from such comparisons is that the simple comparisons, i.e., not controlling for other factors, yield a different view of the system than do the controlled comparisons.

Allen, WB
Wharton School, Urban Mass Transportation Administration, (UMTA-IT-09-0073) Final Rpt. UMTA-IT-09-0073-79-1, May 1979, 51 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-298161/1ST

24 198949
A BRIEF OVERVIEW OF THE RAIL FREIGHT INDUSTRY
An overview of the rail industry was prepared. The objective of the overview was to provide a common level of understanding regarding the nature of the industry, to place the industry in the context of the overall economy, and to provide a preliminary view of industry problems. An introduction to the industry is provided in terms of its structural and operational characteristics. The economics of the industry are discussed in terms of its relationship to the overall economy, its position in the freight market, and the financial condition of the industry itself. Finally, two important constraints on the profitability of the rail industry are described: its relationship with the federal government and its relationship with rail labor.

Pharis, CC
Office of Management and Budget June 1978, 38 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-297402/0ST

24 198995
HUMAN RESOURCE DEVELOPMENT STUDY OF THE SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY
An interdisciplinary research team of the Human Resources Center comprehensively investigated the existing and projected human resource development needs of the Southeastern Pennsylvania Transportation Authority (SEPTA). The objectives were to: (1) assist in determining the human

resources development organizational needs of SEPTA; (2) identify the objectives to be met through human resource development training; (3) determine the organizational resources and constraints to meet identified needs; (4) develop alternatives to accomplish human resource training objectives; (5) develop a plan to implement a human resource development system; and (6) structure a human resource development evaluation model. The recommendations of the study are discussed and analyzed in the report.
See also PB-298161.

Wharton School, Urban Mass Transportation Administration, (UM-TA-IT-09-0073) Final Rpt. UMTA-IT-09-0073-79-2, May 1979, 128 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298405/2ST

24 199120
THE MERGER BETWEEN THE SEABOARD AIR LINE AND ATLANTIC COAST LINE RAILROADS: A CASE STUDY
The study examines the merger of the Atlantic Coast Line into the Seaboard Air Line to form the Seaboard Coast Line Railroad. The objective of the study was to identify the cost, benefits, and service improvements that resulted from the merger. The study team examined the ICC merger docket, company records, and financial statistics and interviewed railroad employees and shippers. The examination was limited to the time between the merger in 1967 and the subsequent merger with the Louisville and Nashville Railroad in 1971. The examination revealed that the original plans and purposes of the merger had been modified considerably in the seven-year interval between filing for the merger and final ICC approval. Further, delays in negotiating new labor agreements immediately after the merger resulted in decreased productivity and increased costs, which depleted the financial resources of the merged company and delayed the addition of major capital improvements. Service improved for some shippers, remained about the same for others, and became worse for others, as the train connection improved in some routes on the new railroads. A detailed analysis of the impact of the merger on employees, management, traffic, shippers, and communities is presented.

Moon, AE Jones, PS
SRI International, Federal Railroad Administration Final Rpt. FRA-/OPPD-79/5, Mar. 1979, 98 p.

Contract DOT-FR-65152

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-299537/1ST

24 300548
RAILPLAN SOUTH DAKOTA. VOLUMES I AND II
In compliance with the 4R Act, South Dakota explores and documents the state of the rail industry in the state. The existing railroad network is identified, along with lines potentially subject to abandonment and lines most important to the state as well as alternatives available to solve the railroad problem. At the time of the study 30% of all trackage ever built in South Dakota had been abandoned and 51% of the remainder had been designated as potentially subject to abandonment. RailPlan Volume I explains the planning process and participation therein. It then gives a rail system overview, a rail-line inventory, describes the light-density lines subject to abandonment and indicates priority classification. Volume II, prepared by consultants, determines the viability of the 25 light-density line segments subject to abandonment.

South Dakota Department of Transportation, Federal Railroad Administration Mar. 1978, 393 p., Figs., Tabs.

ORDER FROM: South Dakota Department of Transportation, Transportation Building, Pierre, South Dakota, 57501

DOTL RP

24 300558
FREIGHT CAR SUPPLY AND THE LEASING PHENOMENON
The activity in the freight car market indicates that not only will fleet capacity grow, but the number of units may increase. The roles played by railroad-owned car pools, and by outside leasing organizations through short-line operators is discussed. The possible trends in car leasing, action on incentive per diem and effects of changes in government regulation could all be important in future ownership patterns. The current status of a major car leasor, Itel Rail, and incentives for car ownership through traditional car leasing companies are the subjects of separate boxes.

Welty, G *Railway Age* Vol. 180 No. 14, July 1979, pp 30-35
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24 300566
INTERCONTAINER MASTERS THE ART OF MARKETING ACROSS FRONTIERS
While Intercontainer, an organization of European railroads, does not operate European container trains on the model of British Railways' Freightliners, this is because there is a fundamental difference between international and domestic traffic which makes concentration of traffic on certain routes difficult. The only exception is to and from certain major ports. Since 1976 Intercontainer has bid for European traffic more selectively, adopting a new initiative in cooperating with road haulers. The results have produced a specialized international marketing company that has been so useful its scope may soon be expanded to new fields.

Hjelt, P *Railway Gazette International* Vol. 135 No. 8, Aug. 1979, pp 715-719, 1 Fig., 4 Phot.

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24 300591
THE BRITISH COLUMBIA RAILWAY--A RAILWAY DERAILED
Originally named the Pacific Great Eastern, the fledgling railway for many years served some small communities in the interior of British Columbia. Taken over by the provincial government (and renamed), the railway began to expand--to North Vancouver to Prince George, and to other nearby communities. For several years it laid more miles of main line track than did any other railway in North America. And then its problems began. Dreams of a railway to Alaska led to rapid expansion in the North. Cheap construction, inadequate planning, and unforseen physical problems resulted in derailments, washouts, and staggering losses-losses so large and ever increasing that in twenty years they would consume as much money as the Province of British Columbia now collects in personal income taxes (unless they somehow are checked). When serious problems become critical, a Royal Commission was appointed to assess the situation and to recommend appropriate actions. This book details the work of that Royal Commission together with its recommendations. It indicates the tenuous control that taxpayers throughout the world have over operations that are government owned, government financed, or otherwise underwritten by the taxpayer. It raises questions about the critical balance between efficient operations and the political forces affecting managerial decisions.

Ruppenthal, KM Keast, T
British Columbia University, Canada 1979, 346 p.

ORDER FROM: British Columbia University, Canada, Center for Transportation Studies, Vancouver V6T 1W5, British Columbia, Canada

24 300594
ANNUAL REPORT ON TRANSPORT STATISTICS IN THE UNITED STATES
Annual summary of individual carrier reports covering financial data and fuel consumption statistics for individual railroads and for regional groupings (Eastern, Southern and Western Districts), as well as cumulative figures for the entire industry. Report first issued in 1887.

Interstate Commerce Commission 1976, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

24 300601
TRANSPORT STATISTICS IN THE UNITED STATES. PART 4. PRIVATE CAR LINES
Annual report of operations of car fleets privately owned or not owned directly by railroads. First published in 1977 and continues former annual Part 9 of Transport statistics in the United States.

Interstate Commerce Commission 1977, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

24 300604
RAILWAY PLANNING IN DEVELOPING COUNTRIES: A CASE STUDY OF COLOMBIA
Describes a study of possible network changes for the Colombian Railway System: a cost model is developed. The study recommends radical changes to the present network.

Drew, JN *Transportation Planning and Technology* Vol. 5 No. 1, 1978, pp 13-27, 5 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
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DOTL JC

24 300721
SOUTHERN RAILWAY RESEARCH
In addition to industrywide research activities, Southern conducts its own programs to utilize applied technology to improve operations, increase efficiency and plan for the future. Data collected by Southern's track geometry inspection car which are stored and analyzed by computer are used for planning track maintenance programs. Its measurements have also been used to development derailment risk, or track geometry rating, which are thresholds at different freight traffic densities to balance cost of surfacing against expected reduction in derailments. Laboratory equipment for fatigue testing, for car rocking and curving investigations, and field equipment for automated rail wear inspections are also described.

Seventy-eighth Technical Conference, American Railway Engineering Association, March 26-28, 1979, Palmer House, Chicago.

Simpson, WW (Southern Railway System) *AREA Bulletin* Proceeding Vol. 80 No. 673, June 1979, pp 372-391, 12 Phot.

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24 300734
STRATEGIC PLANNING FOR RESEARCH AND DEVELOPMENT
This paper examines the need for and the difficulties in implementing strategies for planning the research and development activities of a company. The author does not accept that research planning reduces creativity, though he is of the view that planning's exclusive concentration on economic aspects of a company's activities, such as turnover or profit, can lead to erroneous decisions in the research and development field. This paper outlines a number of specific and explicit research strategies which can be followed, and relates them to the company's strategic objectives. Furthermore, the author explicitly categorizes different types of research and comments upon the relevance of strategic planning to each.

Bemelmans, T *Long Range Planning* Vol. 12 No. 2, Apr. 1979, pp 33-44

ACKNOWLEDGMENT: British Railways
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24 301136
PROBLEMS IN THE NORTHEAST CORRIDOR RAILWAY IMPROVEMENT PROJECT
The Railroad Revitalization and Regulatory Reform Act of 1975 directs the Secretary of Transportation to undertake a 5-year, $1.75-billion project to improve rail passenger service and travel times on the Northeast Corridor between Boston, New York, and Washington by February 1981. The project will not be completed until the end of 1983 (1984 in the Boston area) and the shorter travel times will not be achieved within the $1.75 billion authorized. The Congress should decide what improvements are desirable and what additional money, if any, should be provided. Because budgeted costs are being exceeded, the project's scope was reduced, leading to increased future maintenance costs, less passenger comfort, less on-time reliability, and reduced safety. This report discusses aspects of the project's management and planning which have contributed to these problems.

General Accounting Office Cong. Rpt. CED-79-38, Mar. 1979, 133 p., Phots., 3 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548

DOTL HE1613.N68U62

24 301146
EVOLUTION AFTER THE REVOLUTION. TRAFFIC IN THE PEOPLES REPUBLIC OF CHINA AS A CENTRAL FACTOR OF ECONOMICAL DEVELOPMENT [Evolution nach der Revolution. das Verkehrswesen in der Volksrepublik China als Zentraler faktor der Wirtschaftwirtschaftlichen Entwicklung]
The author reports on a journey through China which took several weeks, which led him over a distance of 3500 km through middle, west and north China. The backbone of the traffic system is without doubt the railway system for freight as well as for public transport. The present traffic volume in a rail network of 50000 km comprises 200000 four-axle freight wagons carrying about 900 million tons a year. Freight transport by road achieves prominence only in the vicinity of cities and in surface traffic of the regions, as there is no coherent long-distance road network. The air traffic network is relatively well established. Planning to the year 2000 envisages particularly the further extension of the rail system by constructing 1000 to 2000 km of new tracks and the purchase of diesel locomotives. Progress is also to be made with the electrification of tracks. Only after 1990 is a significant increase in road traffic expected, where at present the heavy goods vehicle is singularly predominant. With internal stability in China the chances for a strong economic rise can be taken as very favourable. /TRRL/ [German]

Aberle, G (Giessen University, West Germany) *Internationales Verkehrswesen* Vol. 30 No. 2, Mar. 1978, pp 84-88, 2 Phot., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-307802), 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

24 301166
THE DAY AFTER TOMORROW
The difficulties of fitting all the elements of railway planning into the kaleidescope of the future are clearly revealed in the BRB Chairman's lecture which shows the complicated interplay between energy, the quality of life, human needs, investment and other factors and how they affect research and development on the railways.

Parker, P *Railway Engineer International* Vol. 4 No. 3, May 1979, pp 44-45, 4 Phot.

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

DOTL JC

24 301192
FREIGHTLINER COMES HOME A CHANGED COMPANY
Reviews the history of Freightliner (as the National Freight Corporation), its present profitable working and possibilities for the future.

Allen, GF *Modern Railways* Vol. 36 No. 369, June 1979, pp 238-243, 9 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

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24 301319
USE OF RAILROAD RIGHTS-OF-WAY FOR LIGHT-RAIL TRANSIT SYSTEMS
This paper describes the conditions that are required for railroad rights-of-way to be usable for light-rail transit. Some of the locational characteristics of desirable rights-of-way are described. A method for analyzing railroad use and physical characteristics is presented. Several solutions to problems in using railroad rights-of-way are outlined. The design parameters for joint use of rights-of-way are explored. /Author/

This paper appeared in TRB Special Report No. 182, Light-Right Transit: Planning and Technology.

Schwartz, A Wilkins, JD (Chase, Rosen, and Wallace, Incorporated) *Transportation Research Board Special Report* Conf Paper No. 182, 1978, pp 124-130, 3 Fig., 1 Tab., 3 Ref.

ORDER FROM: TRB Publications Off

24 301435
CHINA'S RAILWAYS TODAY
Development of its rail system is given high priority by Chinese People's Republic. Traffic, administration, line extensions, rolling stock and electrification are discussed.

Howard, MG *Modern Railways* Vol. 36 No. 370, July 1979, pp 302-306, 6 Phot.

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24 301439
BETTER MANAGEMENT OF METRO SUBWAY EQUIPMENT WARRANTIES NEEDED
Washington Metropolitan Area Transit Authority has acquired $300 million in rolling stock, train controls, communications, fare collection equipment and escalators for which contract provisions covering warranty and reliability were not effectively administered. Methods for assessing reliability and collecting for warranty work necessary to keep subsystems operable were not established. It is recommended that future contracts include provision for bill-back when operating conditions require in-house repairs; that clear and consistent interpretations be made of warranty classes; and that clear lines of authority be established for enforcing warranty provisions and for making repairs to items so covered.

General Accounting Office PSAD-79-41, Feb. 1979, 41 p., 6 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548

24 301813
RAILROAD RETIREMENT PROGRAM--HOW DOES IT COMPARE TO OTHER SELECTED RETIREMENT PROGRAMS?
This report compares the railroad retirement program with those of Social Security, civil service retirement, military retirement and veterans' pension. While they all provide family maintenance income, they vary widely in size, scope, eligibility requirements, benefits, employment and income restrictions and employee contributions. The railroad program, which provides benefits to more than one million retired and disabled railroad workers, their spouses and their survivors, is administered by the Railroad Retirement Board, an independent agency. GAO was not asked to provide conclusions or recommendations but to provide information that could be used for decisions as to the need for changing the benefits or structure of the railroad benefit program.

General Accounting Office HRD-79-41, June 1979, 53 p., 5 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548
PB-296320/5ST, DOTL JK791.A52

24 302140
THE DB'S CENTRAL RESEARCH STATION IN MINDEN IN THE SERVICE OF SAFETY AND TECHNICAL PROGRESS
In conjunction with the work of the Central Offices, the DB's research stations investigate the functional and safety aspects of new developments and improvements. The author shows by means of examples how the DB's central research station in Minden checks the safety of vehicles and track, and serves technical progress in conjunction with economic considerations. In addition to their main work on behalf of the Central Offices and in international co-operation through the UIC and the ORE, these stations also have an important function as partner of the industry and the universities in that the latter's research and development work is supported by practical tests and specialised railway knowhow. [German]

Westerkamp, U *Eisenbahntechnische Rundschau* Vol. 28 No. 5, May 1979, pp 387-393

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

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24 302155
ON THE DEVELOPMENT OF MANAGEMENT FEES FOR SUBSIDIZED RAIL FREIGHT SERVICE
The Regional Rail Reorganization Act of 1973 provides for payment of management fees to the operator of a rail freight service that uses facilities which the operator does not own or in which he has no capital investment. This paper traces development of the concept of a management fee for subsidized rail service; the rationale for its inclusion in the legislation and program; the positions of the affected parties; and the alternatives considered in its development. A summary and some observations on the practice of utilizing management fees in the rail subsidy program and the current status of the program conclude the paper.

Black, WR (Indiana University, Bloomington) *Transportation Journal* Vol. 18 No. 4, 1979, pp 20-27

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

24 302164
RAILROADING FOR PROFIT, PART IV: GETTING CONTROL OF OPERATIONS
Despite the statistical progress produced by today's railroad operations, performance in terms of service, speed and reliability are not what customers want. Car supply, motive power and fuel shortages all confront railroad management now. Industry efforts, changes in regulatory climate and new approaches to human problems all can contribute to a more efficient, more competitive industry. It is concluded that the technological work has been done; the developmental phases of specific systems are nearing completion. What remains is the motivation and education of people.

Welty, G *Railway Age* Vol. 180 No. 16, Aug. 1979, p 22, 8 Phot.

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24 302166
CARS, POWER AND PROFITABILITY
The primary objective of the Norfolk & Western mechanical department is not to repair cars and locomotives but to make such equipment available to produce gross ton miles. The head of the department discusses management by objective, performance measurement, training programs, management information systems, productivity, equipment availability, facility consolidation, material reclamation and profitability.

Scott, HL (Norfolk and Western Railway) *Progressive Railroading* Vol. 22 No. 9, Sept. 1979, pp 67-74, 9 Phot.

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

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24 302169
THE GREAT RAILROADS. FAMILY LINES GETS ITS ACT TOGETHER--AND THE BOTTOM LINE SHOWS IT
Family Lines, the railway operations of Seaboard Coast Line Industries, form a 16,000-mile system composed of four subsidiaries. The financial, operating, marketing and traffic results from the merger a decade ago of the Atlantic Coast Line and Seaboard Air Line are discussed. Louisville and Nashville has presented the management with special problems which are being overcome; L&N coal traffic growth is one of SCLI's bright spots.

Malone, F *Railway Age* Vol. 180 No. 17, Sept. 1979, pp 28-38, 3 Phot.

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24 302185
RATIONISATION OF A STATE-OWNED RAILWAY SYSTEM TO MEET INCREASED ROAD COMPETITION
The methods of management of the Victorian Railways (Australia) that comprise a network of 6578 km of route radiating from the capital city of Melbourne and the grain ports of Geelong and Portland are discussed and compared with the road transportation systems.

Gibbs, AG (Victorian Railways Board) *Rail International* Vol. 9 No. 9, Sept. 1978, pp 533-541

ACKNOWLEDGMENT: EI
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24 302340
PRODUCTIVITY CHANGES IN CANADIAN AIR AND RAIL TRANSPORT IN THE LAST TWO DECADES
The Research Branch of the Canadian Transport Commission has issued two studies measuring productivity increases for rail and air carriers. Total output and all inputs, including capital, labor, fuel, other materials and services, are quantified. Physical measures of inputs and outputs are used wherever possible with only capital input for rail carriers and other materials for both modes having to be measured in value terms. Over two decades (1956-1975) Canadian Pacific and Canadian National had a combined rate of productivity increase of 3 per cent compared with an annual rate of 1.6 per cent for the U.S. railroads. Level I Canadian air carriers (Air Canada and CP Air) had productivity increases of 4 per cent per annum and Level II regional air carriers increased at a 1 per cent rate. Further analysis would be needed to trace the cause of productivity gains--economy of scale and technological innovation are probable factors.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Hariton, G Roy, R (Canadian Transport Commission)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 55-58, 5 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

24 302341
A NETWORK APPROACH TO RAIL SYSTEM RATIONALIZATION
Procedures now employed in analysis for abandonment of light-density line segments are designed to improve system productivity by simply purging the network of its least productive segments, rather than maximizing system productivity through changes in network structure. This study illustrates a methodology which serves to minimize both railroad operating costs and traffic losses through controlled changes in the geographic configuration of a railroad. It can be applied to merger, line-segment acquisition and trackage rights studies involving more than one railroad.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Hord, TA (Southern Railway System)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 60-67, 3 Fig., 2 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

24 302350
DIVERSIFICATION IN MAJOR U.S. TRANSPORTATION FIRMS
Analysis of diversification of top transportation firms shows they tend to diversify into non-transportation industries that serve the same markets as do their transportation operations. Railroads have added primary manufacturing and natural resource segments. Airlines emphasized service activities such as hotels and food. The sample of motor carriers and water carriers was generally limited in the Fortune top 50 transportation firms. Across modes, diversification has been greater for larger firms. This holds true also within the modes. The percentage of non-transportation activity decreases in the modal order of water, rail, air and motor carrier, while rate of return on assets occurs in reverse modal sequence. While diversification is more widespread in the less profitable modes, the diversified firms in any mode tend to be the more profitable. Further study is needed of diversification as a corporate strategy for transportation firms.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Davis, FW, Jr Cunningham, LF Wishart, AP Wood, WR (Tennessee University, Knoxville)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 221-232, 1 Fig., 3 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

24 302351
RAIL-BASED HOLDING COMPANIES--ALTERNATIVE TO INTERMODAL OWNERSHIP
Normal corporate strategic response to the decline of a product/market segment such as confronts railroads is development of more promising lines of business. Because legislation and regulation prohibit rail entry into more profitable intermodal fields, railroads have tended to move into non-transport businesses. This paper examines the two strategies adopted by rail-based holding companies with highly diversified firms concentrating on non-rail businesses and less diversified firms concentrating on their rail operations. It appraises inadequate rail returns as a prior event which led to diversification as well as examining capital consumption to learn if highly diversified firms tended to neglect railroad plant.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Graham, KR (Pennsylvania State University, University Park)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 238-244, 7 Tab., 14 Ref.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

24 302362
STRIKE INSURANCE--AN ANALYSIS OF THE AIRLINE AND RAILROAD MUTUAL AID PACTS
The airline and railway mutual aid pacts are reviewed. The Air Deregulation Act of 1978 eliminated the industry strike insurance fund for airlines. Railroad labor has attempted to have strike insurance declared illegal. The pros and cons of the agreements are discussed. Recommendations are made on the use of strike insurance. It appears airline management has lost a valuable aid in collective bargaining. Railroad deregulation would seem to be accompanied by a ban on strike insurance if it comes to pass. It is difficult to predict any improvement in railroad labor productivity given the absence of the plan since railroad management is completely vulnerable to the strike tactic.

Proceedings of the Twentieth Annual Meeting of the Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Vellenga, BD (Iowa State University, Ames); Rosen, S (Illinois University, Chicago)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 408-415, 8 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

24 302697
RAILROADING FOR PROFIT: PRODUCT QUALITY
With steady price escalation and long backlogs, the relation between railroads and their suppliers is subjected to strains. The problems of product quality control, research and development activities, foreign buying, competitive market forces and lack of long-range planning confront organizations that provide equipment and materials as well as their railroad buyers.

Welty, G *Railway Age* Vol. 180 No. 20, Oct. 1979, pp 40-45, 8 Phot.

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24 302708
PROJECTED TRENDS AND OPERATING OF NEW HIGH POTENTIAL INFRASTRUCTURE, WITH A VIEW TO ITS IMPROVED INTEGRATION IN THE EXISTING NETWORK
Presenting a look at the general programming criteria and the initial indications on the primary objectives, the paper sets out the solutions adopted when setting up projects and fixing the operating system for new high capacity infrastructure, within the framework of other important aspects in Italian rail development (accessibility of intermodal transport, raising of speeds on existing lines, contributions related to compatibility of track of conventional design).

IRCA/UIC (International Railway Congress Association/International Union of Railways) Congress, 22nd Session, Stockholm, Sweden, May 7-12, 1979.

Pandolfo, A (Italian State Railways) *Rail International* No. 4, Apr. 1979, pp 379-397

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24 302715
PRODUCTIVITY IN U.S. RAILROADS
Identifies the problems which must be overcome if the productivity of American railroads is to be improved, and offers suggestions for achieving greater cooperation from labor, more progressive marketing, and better utilization of plant and equipment.
Proceedings of a Symposium held at Princeton University, July 1977.

Kerr, AD Kornhauser, AL
Pergamon Press 1979, 370 p.

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

24 302718
THE MASS TRANSIT EQUIPMENT SECTOR IN ONTARIO AND QUEBEC
The domestic mass transit equipment sector can best thrive by penetrating international markets. In order to be competitive in this market place, national consortia will have to be formed. This can only come about if the Federal government is willing to aid in the formation of national consortia, along with vehicle producers, transit operators, labour, consultants and other relevant interests. This conclusion is based on a detailed examination of the interests, problems and prospects for the equipment sector within Canada, North America and international markets. The study is divided into five parts. Part One presents an overview of the sector, identifying supplier-operator relationships and government involvement. Part Two discusses the roles of research and development in the sector. Part Three elaborates on the current state of the sector in Canada, including information from The Urban Transportation Equipment Industry in Canada, published by the Federal Department of Industry, Trade and Commerce. Part Four presents a range of strategies that the sector could adopt in marketing their products. All are based on collaborative actions by the interests that form the sector. Part Five provides a brief summary on the study. The appendix presents the results of the two surveys, notes on the one day seminar held on October 6, 1978; a copy of the transit property questionnaire and the bibliography.

Ginsherman, MG
Toronto-York University Joint Program in Transp Res Rpt. No. 61, No Date, 61 p.

ORDER FROM: Toronto-York University Joint Program in Transp, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario M3J 1P3, Canada

24 303251
CAN THE WORK PROBLEMS BE RESOLVED?
Southern Railway has been a leader in combining innovations in rail technology with a consistent effort to deal realistically with the impact of existing labor contracts so as to achieve positive adjustments to such technology. The relation of railroad industry labor costs to capital investment and return on investment are discussed, along with the impending challenges of labor negotiations to increase productivity in the operating craft unions.

Paul, GS (Southern Railway System) *Progressive Railroading* Sept. 1979, p 91

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

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24 303252
NEW ROLES FOR INTERMODALISM
From its initial role as a rail-related alternative to the flexibility and high levels of service provided by motor carriers in moving time-sensitive commodities, piggyback needs now to evolve as a distinct and unique element in the transportation service market which is not an adjunct to other railroad operations. New policies and new strategies would be necessary to market intermodalism as a unique service. Rail carload and intermodal would be offered as two distinct types of transportation service. The author then describes the evolution of intermodalism on Santa Fe which has been innovative in marketing and handling this business.

Wright, JF (Santa-Fe Railway) *Progressive Railroading* Vol. 22 No. 11, Nov. 1979, pp 31-34, 4 Phot.

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

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24 303266
CONTINUATION OF RAIL SERVICE BY THE MILWAUKEE RAILROAD: REPORT TO ACCOMPANY H. J. RES. 341
No Abstract.

United States House of Representatives No. 96-225, May 1979, 6 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
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24 303582
THE GREAT RAILROADS-FLORIDA EAST COAST: "WE DARED TO BE DIFFERENT"
Seventeen years after it was struck over work rules, Florida East Coast has bounced back from imminent bankruptcy to a level of productivity, revenue traffic, and freight service quality not matched elsewhere in U.S. railroading. Described are the new work rules, wage rates, schedules, customer approval, and plant improvements including the most intensive installation of concrete cross ties in the U.S.

Miller, LS *Railway Age* Vol. 180 No. 22, Nov. 1979, pp 26-30, 3 Phot.

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24 303584
RAILVIEW: THE CASE FOR THE FIREWALL
The author's earlier proposal for restructuring of the bankrupt northeastern railroads is revived in the light of the failure of Conrail to perform according to projections of United States Railway Association and the road's own management. While USRA has examined alternatives, including the proposal that bankrupt trackage east of Buffalo, N.Y., and Harrisburg, Pa., be acquired by the federal government and operated as a terminal carrier reached by principal eastern and southern lines, it was concluded that the present Conrail configuration should be continued. The author gives new reasons for a continuing study of this configuration which he sees as a means of stemming any spread of railroad nationalization.

Fishwick, JP *Railway Age* Vol. 180 No. 22, Nov. 1979, p 46

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24 303585
HOW THE CANADIANS TURNED DEREGULATION INTO PROFIT
Series of nine articles, a review of the Canadian scene, includes the following: How the Canadians turned deregulation into profit; The message on deregulation; Crow rates strangle grain exports; Ironing out the gradients to give more capacity; Drive to mechanise track renewal goes ahead; CP puts it faith in the high-cube container; Potentially one of the big exporters; Edmonton success blazes light rail trail; Hamilton may have first peoplemover.

Railway Gazette International Vol. 135 No. 12, Dec. 1979, p 1091

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24 303590
THE LIRR: A SYSTEM RIDING TROUBLED TRACKS
Long Island Rail Road, which transports one of every four rail commuters in the U.S., is confronted with dissatisfied riders, huge deficits met with government expenditures, and a plant in need of massive upgrading even after two decades of rehabilitation. Some major hardware deficiencies include the communications network, absence of an automated central control, limited electrification, and an outmoded signal system. An overview of plans and details of electrification and a computerized monitoring system are included.

Mason, JF *IEEE Spectrum* Vol. 16 No. 12, Dec. 1979, pp 33-41, 4 Phot.

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24 303636

TRUNK LINES IN THE SOVIET UNION [Stal'nye magistrali strany]

During the last 25 years over 21,000 km of new line have been built in the USSR. The article describes the most important lines according to region, together with bridges, tunnels and other railway installations (e.g. approach track) constructed. [Russian]

Melkonov, SS *Transportnoye Stroitel'stvo* Vol. N Aug. 1979, pp 6-10, 4 Phot.

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

24 303865

RAILROADING FOR PROFIT: THE PEOPLE FACTOR

The ultimate contributor to railroad profitability is identified as people--management, labor, and all others including government and the populace to which it is responsible. Having previously considered the roles of plant, equipment, operations and marketing, this installment considers the complexities of such factors as centralized vs decentralized management, marketing vs production, labor at the local and national levels, government intervention in labor-management relations, and productivity in an industry that has steadily lost its share of market since World War II. Management inertia, labor intransigence and government ignorance have all contributed to improved positions of competitors but this could change.

Welty, G *Railway Age* Vol. 180 No. 23, Dec. 1979, pp 24-28

ORDER FROM: ESL

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24 304126

CHINA: A STATISTICAL COMPENDIUM; A REFERENCE AID

This handbook of estimates of economic performance in the People's Republic of China is the fifth in an annual series. Individual estimates in this issue contain not only statistics for 1978, the latest calendar year of coverage, but also revisions of statistics presented in the past. The main topics covered include aggregate performance, population, agriculture, industry, energy, minerals and metals, transportation, and foreign trade.

Paper copy available on Standing Order, Deposit Account required. North American Continent price based on page count of individual documents; all others write for quote. This series offers an approximate 20% reduction in price as a Standing Order.

Central Intelligence Agency ER-79/10374, July 1979, 19 p.

ACKNOWLEDGMENT: NTIS
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24 304663

PROCEDURES FOR MULTI-STATE MULTI-MODE ANALYSIS: SECOND YEAR'S RESEARCH. VOLUME 1

The report describes results from the second year's effort on a continuing research project titled "Analytical Procedures for the Study of a Specific Multi-modal Transportation Corridor." The objective of the research is to devise quantitative relationships between economic development opportunities and multi-modal transportation improvements. Specific results reported in this volume include: (1) A state-of-the-art review of freight transportation technology with emphasis on intermodal facilties, (2) Preparation of industry profiles for 73 industry groups, with 95% of material inputs identified, (3) Employment based market share analysis, (4) Testing of the network structure, (5) Improvements in transportation costs, (6) Comparison of costs and freight rates, (7) Network improvement analysis, and (8) Production and marketing zone location. The objective of the third-year effort will be a demonstration of the analytical procedure to the Multi-State Corridor, which extends from Kansas City to Brunswick-Jacksonville.

See also PB-300 814. Prepared in cooperation with Alabama University in Birmingham, Arkansas State University, State University, and Auburn University, AL.

Sharp, GP
Georgia Institute of Technology, Office of the Secretary of Transportation
Final Rpt. DOT-OST-80050-9, June 1979, 231 p.

Contract DOT-OST-80050
ACKNOWLEDGMENT: NTIS
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PB-300813/3ST

24 304664

PROCEDURES FOR MULTI-STATE MULTI-MODE ANALYSIS: SECOND YEAR'S RESEARCH. VOLUME II

The document presents the results of a second-year research program, in the areas of implementation planning techniques, policy analysis, and evaluation techniques for an analytical procedure designed to identify quantitative relationships between transportation improvement programs and economic development opportunities. The transportation services of interest include both existing and developmental modes and intermodal services. The analysis focuses on the Multi-State Corridor extending from Kansas City to Brunswick-Jacksonville. Significant second year results include: (1) Concept of the success scenario, (2) Definition of a list of stakeholders for evaluation, (3) Review of alternative legislative plans, and (4) Review of alternative organization and financial plans. The focus of the third year's research will be a demonstration of the analytical technique.

See also Volume 1, PB-300 813, and PB-276 001. Prepared in cooperation with Alabama Univ. in Birmingham., Arkansas State Univ., State University., and Auburn Univ., AL.

Jones, PS
Georgia Institute of Technology, Office of the Secretary of Transportation
Final Rpt. DOT-OST-80050-10, June 1979, 139 p.

Contract DOT-OST-80050

ACKNOWLEDGMENT: NTIS
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PB-300814/1ST

24 308431

RAILROAD EMPLOYEE ATTITUDES: A CASE STUDY

Cooperation between rail management and rail labor would be enhanced if management maintained an awareness of attitudes and opinions of workers toward job-and company-related issues. This study represents a first step in documenting attitudes and opinions and was achieved through cooperation of an eastern Class I railroad and its United Transportation Union employees. The study sought to determine employee attitudes toward a variety of issues including quality of first-line supervision, company and job characteristics, trends, competitive position of the railroad, and the nature of labor/management relations. Implications of findings include need for improved communications, fringe benefit improvements as a means of changing work rules, and better qualification for supervisors such as trainmasters.

Lieb, RC Wiseman, F Gbur, J (Northeastern University) *Transportation Journal* Vol. 19 No. 1, 1979, pp 62-70, 16 Tab.

ORDER FROM: ESL

DOTL JC

24 308432

REVIEW OF RAIL TRANSPORT RESEARCH NEEDS

This is a follow-up of a TRB 1975 study on rail transport research needs. The review was to determine whether research was still needed, whether priorities had changed and whether any new research needs had arisen. The report includes summary statements on the recommended research agenda by AAR, FRA Office of Research and Development, and FRA Office of Policy and Program Development. A restructured agenda shows most priorities unchanged except that energy systems, service quality, accounting methods, terminal management and railroad costs have all been advanced to higher status. New priorities reflect a greater appreciation of increased track deterioration caused by heavier wheel loads, the impact of the energy crisis, the need for improved costing to increase profitability, and recognition that opportunities for increased traffic depend largely on better service for shippers. The bibliography, from Railroad Research Information Service, covers AAR, FRA and ICC reports and ongoing projects arranged according to the research matrix developed by the review group.

Transportation Research Board Special Report No. 188, 1980, 78 p., 2 App.

ORDER FROM: TRB Publications Off

25 186738
TRANSPORTATION TRENDS, ISSUES AND RECOMMENDATIONS
The report is the culmination of research and other activities of the Missouri Transportation Policy Council Staff. It includes an analysis of transportation trends in the state and any potential shifting of loads from one mode to another. The report also comments on several areas of transportation financing and the present situation in Missouri. Recommendations for future transportation based programs and development activities are listed.

Missouri Office of Administration Final Rpt. Jan. 1978, 36 p.

Grant HUD-CPA-MO-07-00-105 (1)

ACKNOWLEDGMENT: NTIS
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PB-286491/6ST

25 197722
IMPACTS OF PROPOSALS FOR REFORM OF ECONOMIC REGULATION ON SMALL MOTOR CARRIERS AND SMALL SHIPPERS
The study reviews existing evidence on the effects of changes in economic regulation on small carriers and small shippers. Small carriers, particularly owner operators have experienced stabilized levels of compensations from regulated lessor carriers so that a change in regulation would not affect their compensation rates. Small shippers are shown to be affected by rate and service concepts used conventionally in pick up and delivery service. Examination of pick up and delivery cost formulas and data suggests that under relaxed regulation there would be economic incentives for shippers to consolidate their shipments rather than for carriers to consolidate their pick up and delivery service.

Charles River Associates, Incorporated, Office of the Secretary of Transportation Final Rpt. July 1977, 93 p.

Contract DOT-OS-60527

ACKNOWLEDGMENT: NTIS
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PB-296086/2ST

25 198042
MISSOURI STATE RAIL PLAN
Contents: State rail planning process; Carrier characteristics; Classes of rail service; Passenger service; Individual line by line analysis; Participation in the planning process.
Prepared in cooperation with Englund (Carl R.), Jr. and Son, Pleasantville, NY. Sponsored in part by Ozarks Regional Commission, and Federal Railroad Administration, Washington, DC.

Missouri Department of Transportation, Englund (CR) and Son-Transportation Consultant, Federal Railroad Administration Aug. 1978, 212 p.

ACKNOWLEDGMENT: NTIS
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PB-293756/3ST

25 198059
EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION- AN ASSESSMENT
The report assesses the extent to which evaluation within the Department of Transportation is an established part of the management process and the extent to which evaluation activities are aimed at serving congressional and executive branch decisionmaking needs. The report also contains recommendations on how the usefulness of these activities can be improved.

General Accounting Office Cong Rpt. PAD-79-13, Apr. 1979, 99 p.

ACKNOWLEDGMENT: NTIS
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PB-293956/9ST

25 198096
A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS
The report describes and summarizes Federal transportation policies and programs as enunciated by the executive, congressional, and judicial branches. The report contains a narrative description of the sources of Federal policies and programs for the intercity, urban, rural, and international markets, with attention to the gaps and conflicts in these policies and programs. Appendixes A and B list, respectively, the 30 congressional committees and the 64 Federal agencies with transportation responsibility. Appendix C provides more detailed descriptions of approximately 1,000 transportation policies and programs of these 64 agencies.

National Transportation Policy Study Commission Spec Rpt. NTPSC/SR-79/06, Mar. 1979, 423 p.

ACKNOWLEDGMENT: NTIS
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PB-294454/4ST

25 198706
STATE AND LOCAL TRANSPORTATION POLICIES AND PROGRAMS
The report considers transportation institutions, programs, and policies from an intergovernmental perspective. It includes: an inspection of pertinent Federal legislation and programs; an analysis of state and local institutions responsible for transportation, including state departments of transportation, modal transportation agencies, state regulatory bodies, local governmental and quasigovernmental bodies; a discussion of state and local transportation programs; an overview of transportation policies and policy issues of concern to state and local governments; and a discussion of major conflicts engendered by present approaches to the provision of transportation at the state and local level.

National Transportation Policy Study Commission Spec Rpt. NTPSC/SR-79/04, Apr. 1979, 133 p.

ACKNOWLEDGMENT: NTIS
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25 300549
NORTH DAKOTA STATE RAIL PLAN. VOLUMES I AND II
In compliance with the 4R Act, North Dakota assesses 11 light-density branch lines in the state which are vulnerable to abandonment although such abandonments have not been a major issue there. Volume I, Analysis of Rail Transportation, identifies rail related problems and issues; identifies state policy criteria; and indicates data sources. Significant in the state have been high freight rates, deterioration of quality of service, persistent grain car shortages, rail mergers, bankruptcy of the Milwaukee Road, threats of reduced Amtrak service, and community impacts from growing movements of unit coal trains. Volume II, Branch Railroad Line Assessment, includes rail line viability assessments and abandonment impacts, prioritization of rail lines, and state implementation of 4R assistance.

North Dakota State University, State Planning Division, Federal Railroad Administration Feb. 1979, 322 p., Figs., Tabs., Apps.

ORDER FROM: North Dakota State University, Upper Great Plains Transportation Institute, Fargo, North Dakota, 58102

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25 300588
ECMT ROUND TABLE 41 (PARIS, 2-3 MARCH 1978). ROLE OF TRANSPORT IN AN ANTI-CYCLIC POLICY [CEMT. Table ronde 41 (Paris, 2-3 mars 1978). Role des transports dans une politique anti-cyclique]
This study devoted to anti-cyclic policy, which is by definition a short and medium term policy, consists of two main chapters. The first deals with the general form of economic cycles, and the objectives and instruments of an anti-cyclic policy; the second is devoted to transport and anti-cyclic policy. [French]

Bayliss, BT
European Conference of Ministers of Transport UIC Cat. 01 N184, 1978, 61 p.

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 300592
NEGOTIATIONS FOR LOCAL RAIL SERVICE CONTINUATION: THE MAJOR ISSUES
Negotiations between state agencies and railroads being a relatively new engagement, the purposes of this article are to review the major issues that

emerged during the negotiations between ConRail and the 13 states in which that railroad would provide subsidized rail freight service and to identify how these issues were resolved. But first the context within which these negotiations took place is considered, since this may have had an impact on the proceedings.

Black, WR *Traffic Quarterly* Vol. 31 No. 3, July 1977, pp 455-469

ACKNOWLEDGMENT: General Motors Research Laboratories (GMRL 77-218)
ORDER FROM: ESL

DOTL JC

25 300599
PRESENTATION BY SIR PETER PARKER, CHAIRMAN OF THE BRITISH RAILWAYS BOARD, ON BRITISH RAILROAD EXPERIENCE
No Abstract.

United States House of Representatives 1978, 48 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

25 301179
THE CORPORATE CONTRACT BETWEEN THE STATE AND THE SNCF
The main purpose of this Corporate Contract is to specify the framework within which the SNCF is to exist until 1982. The objectives of the contract are three in number: Development of the activities of the SNCF, improvement in the quality of the service, and correction of the financial situation of the undertaking. To achieve these objectives the means envisaged are: greater self-management, investments guaranteeing the future of the undertaking, continuing improvement in productivity, readjustment of the contribution to infrastructure charges, granting of a decreasing balancing subsidy.

Gentil, P *Rail International* Vol. 10 No. 6, June 1979, pp 521-529

ACKNOWLEDGMENT: International Union of Railways, BD
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25 301440
ISSUES BEING FACED BY THE WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
Cost estimates for constructing the national capital's rapid-rail transit system have increased from $2.5 billion in 1969 to $6.8 billion at the end of 1978. Metro attributes almost half of the increased cost to schedule delays and cost escalation. Neither of the figures includes $3 billion of estimated financing costs associated with the revenue bonds sold to help finance construction and some other adjustments. The Federal Government's share of all costs is projected at $7.4 billion and the state/local share at $2.7 billion. This report discusses whether costs should be paid through fares or area taxes; the effect of Federal funding being less than Metro says it needs; the need for a revenue source dedicated to pay the costs of mass transportation; the issues surrounding parking at rail stations and subsidized employee parking; handicapped accessibility.

General Accounting Office CED-79-52, Apr. 1979, 82 p., 3 App.

ORDER FROM: General Accounting Office, Distribution Section, Room 1518, 441 G Street, NW, Washington, D.C., 20548 NTIS
PB-293959/3ST

25 301833
THE ROLES OF COMPETITION AND REGULATION IN TRANSPORT MARKETS
Reference is made to the National Transportation Act (NTA) of 1967, and Bill C-33, an act to amend the NTA and other legislation which was introduced into parliament in 1977. The authors of this paper consider that it is misguided for the Canadian government to make these changes in the objectives of the national transport policy and to require the regulation of freight transport by the Canadian Transport Commission (CTC) consistent with the revised transport policy. This paper argues in favour of regulation to facilitate the efficient working of competition in transport markets and against the regulation of commercial rates and services by the CTC to achieve non-economic objectives, and is directed to the regulation of freight rates and service conditions set commercially. This paper is in five parts. First, it examines the existing national tranpsportation policy and the policy set down in Bill C-33. The implications of the policy for the criteria by which transport would be regulated are described. The second part reviews the working of transport markets and of regulation since the NTA of 1967. Third, the paper examines the decisions of the CTC which would be affected significantly by the change in the criteria for regulation. The results likely from the application of the new criteria are considered in the fourth section. Conclusions are reached in the final part of the paper by comparing the experience with the present policy and the probable results of the policy proposed in Bill C-33. /TRRL/

Heaver, TD Nelson, JC (Washington State University) *Logistics and Transportation Review* Vol. 14 No. 4, 1978, pp 359-378, 28 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241524)
ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

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25 301842
ROUTE INVESTMENTS WITHIN THE SCOPE OF THE NATIONAL TRANSPORT POLICY AS ILLUSTRATED IN THE FEDERAL REPUBLIC OF GERMANY
This report refers to the economic impact of investments in the differing transport modes and suggests that with financial resources becoming scarcer, such investments should not lead to competition between modes but to transport policy targets within a national transport policy. These targets, related to present day conditions in the federal republic are stated to be: the maintenance and furtherance of the mobility of the inhabitant and of the economy; the maintenance of an appropriate transport structure for a steadily developing economy; the securing of the free choice of the means of transport in a controlled competitive system. The present national transport routes investment policy is reviewed, and information provided on the co-ordinated investment programme for the federal transport routes up to the year 1985 in respect of the German Federal Railway, federal trunk roads, federal waterways, air-traffic control and airports. The implementation (and continuing review) of planned investment strategy is discussed, and consideration given to the international aspects of the transport routes investment policy. /TRRL/

Haeusler, U *Rail International* No. 3, Mar. 1979, pp 223-235, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 241530)
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25 301844
TRANSPORT IN THE EUROPEAN COMMUNITIES
The article reviews the development of transport policy within common market countries and suggests reasons for lack of progress in certain policy areas. Two factors have made it possible for individual countries to follow nationalistic policies with respect to transport. Firstly, vagueness in the wording of the transport treaty has allowed different interpretations of its aims, and secondly, with no discrimination in transport rates on a nationality basis, failure to achieve a common policy was not seen as preventing the basic aims of the treaty from being achieved. It is suggested that future policies should concentrate on harmonization of such factors as formalities and price discrimination if progress is to be made.

Bayliss, BT (Bath University) *Journal of Transport Economics and Policy* Vol. 13 No. 1, Jan. 1979, pp 28-43, 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241339)
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

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25 301845
SOME RECENT THINKING ON FREIGHT TRANSPORT PRICING IN FRANCE AND SWITZERLAND
Two studies on the general organisation of transport systems, conducted in France and Switzerland, have examined the problem of freight transport pricing. Both the studies were inspired by increasing dissatisfaction with current transport policies and financial commitments by governments to cover railway operating deficits. The article reviews the main conclusions of the studies with emphasis on the recommendations concerning transport

pricing. These are said to oppose the interventionist policies which have been a feature of transport policy in many countries.

Rathery, A (European Conference of Ministers of Transport) *Journal of Transport Economics and Policy* Vol. 13 No. 1, Jan. 1979, pp 44-51, 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241340)
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

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25 301849
TRANSPORT SUBSIDIES: AN OVERVIEW
The general economic case against subsidies is stated to rest primarily on the argument that competition can achieve an economically optimal allocation of resources and that subsidies therefore cause costly distortions from that optimal situation. Such economic considerations are discussed by reference to economies of scale in relation to Canadian transport policy, and the implication that transport subsidies are most easily justified if economies of scale are great and the elasticity of demand for the service is high. Federal government direct subsidies to transport carriers in 1976 is shown to have been rail $298 M, water $103 M, Atlantic region freight assistance $25 M, air $2 M, and it is stated that this represents only one-sixth of total direct and indirect subsidies provided to the transport modes by all levels of government in Canada. These subsidies are discussed, and consideration given to the social issues of transport subsidies by a discussion of general socio-economic benefits, income redistribution and regional development. It is concluded that it would appear there is little need for transport subsidies in Canada in order to meet economic efficiency criteria, and that such subsidies appear to be paid predominantly for social reasons unconnected with transport efficiency.

Heads, J (Canadian Transport Commission) *Logistics and Transportation Review* Vol. 14 No. 4, 1978, pp 379-390, 3 Fig., 14 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 241523)
ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

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25 302134
UNDERSTANDING FEDERAL TRANSPORTATION REGULATORY CHANGE: A STUDY OF ONE SET OF ENERGY-TRANSPORT POLICY-MAKING MECHANISMS
This paper presents information that may help transportation researchers to influence Federal actions on economic regulatory reform. Many papers report on the findings of studies made to analyze the implications of regulatory reform and then are immediately forgotten. This paper reports on an attempt to provide a means for avoiding this situation in a related regulatory change research area. First, it describes specific Federal agency policy-making channels in a major area of transportation regulation, namely energy materials transport. Then it suggests methods for stimulating these channels in a major area of transportation regulation, namely energy materials transport. Then it suggests methods for stimulating these channels toward implementation of regulatory and legislative energy-conservation policies in this area. Because of the multi-modal pervasiveness of energy materials transport and today's increasing importance of transportation fuel costs, it is anticipated that understanding these policy-making channels and implementation techniques can also benefit transportation economic reform researchers.

From joint national meeting of the Institute of Management Sciences and the Operations Research Society of America; New Orleans, Louisiana, April 30, 1979.

Bertram, KM Bernard, MJ, III
Argonne National Laboratories CONF-790455--2, 1979, 13 p., 17 Ref.

Contract W-31-109-ENG-38

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25 302157
PRIVATE WANTS VERSUS PUBLIC NEED: A DILEMMA FOR STATE TRANSPORTATION REGULATORS
Although the states initiated regulation over intrastate commerce, the Interstate Commerce Commission has long led the way in transportation regulation. The prospects of Federal deregulation with no simultaneous reduction in state regulatory powers could find state commissions less able to balance private wants against public need with carriers expected to dominate future intrastate revenue proceedings. The author believes it unlikely that states might impose overly stringent regulation.

Wilner, FN *Transportation Journal* Vol. 18 No. 4, 1979, pp 77-84

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606.

DOTL JC

25 302273
AN ASSESSMENT OF INSTITUTIONAL BARRIERS WHICH PROHIBIT PARTICIPATION AND THE PROJECTED COST ASSISTANCE NECESSARY TO PROVIDE EQUAL OPPORTUNITY TO COMPETITIVE AND NEGOTIATED CONTRACTS IN UMTA FEDERALLY ASSISTED PROJECTS
This report provides an assessment of and recommendations for the removal of barriers to Minority Business Enterprise (MBE) participation in transit construction. Institutional barriers to MBE participation were reviewed in seven cities/sites (Houston, Albuquerque, Cleveland, Chicago, Detroit, Los Angeles, and Pueblo Test Center), and assistance mechanisms were identified and assessed in terms of their effectiveness in providing MBE access to transit construction projects. In addition, the report outlines a goal setting process that UMTA can apply to construction oriented projects. The research effort identified nine overt barriers that all MBEs are confronted with in the day-to-day operation of their businesses, namely: Management Capability; Knowledge of and Aspects of Financing; Access to Industry; Estimating Costs; Marketing Strategy; Access to all Markets/Mobility; Size of Dollar Volume; Access to Bonding; and Procurement Process. Access to the heavy construction industry was perceived as the most crucial barrier by MBEs, majority contractors, assistance mechanisms (Contractor Assistance Organizations), and financial institutions. Data collection techniques included on-site surveys, interviews, inspection tours, printed materials, and follow-up interviews. The author recommends the establishment of a Demonstration MBE Construction Unit as an UMTA-funded assistance mechanism which will have the responsibility of fully utilizing all of the administrative and programmatic tools available within UMTA, to achieve a goal of twelve percent of the transit construction award dollars on an annual basis. (UMTA)

Appendixes herein are: TRAVENCA Focus Group Moderator's Topic Guide; Representative Sample of Data Collected on Barriers; Analysis of Court Actions; Barrier #9-Procurement Process; Identification of Assistance Mechanisms; Bibliography; and Secondary Reference Materials Reviewed.

TRAVENCA Development Corporation, Urban Mass Transportation Administration, (DC-06-0218) Final Rpt. UMTA-DC-06-0218-79-1, Mar. 1979, 103 p.

Contract DOT-UT-80026

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PB-300354

25 302335
INVESTMENT PLANNING AND CHECKS INTO RESULTS FOR SHORT DISTANCE PASSENGER TRAFFIC [Investitionsplanung und Erfolgskontrolle im Personennahverkehr]
Since 1970 cost-benefit analyses have been carried out in Federal Germany to ensure that credit granted for transport in local communities is used properly. A standard method is to be used but it has some weak points and the article makes appropriate suggestions as to how to overcome these. Taking the example of the Munich and Stuttgart metropolitan railways, the authors show all the factors that should be taken into account in assessing all indirect costs and benefits. [German]

Willeke, R Zebisch, K-D *Zeitschrift fuer Verkehrswissenschaft* Vol. 50 No. 2, 1979, pp 71-97, 11 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hellendoorn (A) Verlag, Stettiner Strasse 1, Postfach 78, 4442 Bentheim, West Germany

25 302342
A FRAMEWORK FOR THE ALLOCATION OF SUBSIDY TO UNREMUNERATIVE RAIL LINES
This paper develops a framework for allocation of subsidy to unremunerative rail lines. Problems involved in assessing the loss of regional income due to

abandonment and a listing of some factors which should be considered in the analysis are presented. If the loss in the regional income because of abandonment exceeds the subsidy necessary to keep the service, the state or local government should subsidize the line. Benefits and costs of other measures such as highway improvement should be appraised also, possibly cushioning the effects of abandonment by lowering transportation costs to the next best alternative.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Pagano, AM (Illinois University, Chicago)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 68-74, 6 Ref.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

25 302345
RAILROAD VOLUME COAL RATES: A PROLIFIC SOURCE OF REGULATORY INTERVENTION
This review evaluates an hypothesis that a regulated firm, in seeking approval to employ a specific innovative device to improve its well-being, is constrained through the regulatory process from maximizing the benefits which it would expect to derive from a less restrictive system or from a free-market environment. New concepts for pricing the movement of bulk commodities in volume has led to a continuous stream of regulatory and judicial proceeedings involving the railroads. In the case of steam coal, shippers and receivers formerly were supportive of railroads' position while more current litigation finds users of rail service as the principal adversaries. ICC has responded by its decision "Change of Policy Railroad Contract Rates" in November 1978. The extent to which adoption of this policy may reduce litigation attending introduction of an innovative service or pricing scheme cannot yet be conjectured.

Proceedings of the Twentieth Annual Meeting of The Transportation Research Forum, "Transportation Alternatives in a Changing Environment", held October 29-31, 1979, Drake Hotel, Chicago, Illinois.

Sloss, J (Massachusetts Institute of Technology)
Cross (Richard B) Company Proceeding Vol. 20 No. 1, 1979, pp 93-100, 2 Tab.

ORDER FROM: Cross (Richard B) Company, P.O. Box 405, Oxford, Indiana, 47971

25 302375
COST SHARING FOR INTER-MUNICIPAL TRANSIT
This report describes the development and testing of a method of dividing transit deficits between several municipalities served by a single, integrated, subsidized system. In tests of the suitability of various formulae in terms of equity and efficiency, it was found that the formula most closely reflecting the true distribution of costs was most likely to encourage higher efficiency and also the most equitable in terms of allocating subsidies to municipalities with the highest average incomes. (TRRL)

Prepared by Transport Canada, Canadian Surface Transportation Administration, Urban Transportation Research Branch.

Fortin, G
Department of Transport, Canada Monograph Feb. 1979, 20 p., 5 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 242058), Roads and Transportation Association of Canada
ORDER FROM: Department of Transport, Canada, 1000 Sherbrooke Street, West, P.O. Box 549, Montreal, Quebec H3A 2R3, Canada

25 303250
RESEARCH SEMINAR SERIES
This is the text of four seminars presented to the Canadian Transportation Commission in 1978. The papers are presented as a contribution to continuing discussion of development of transportation policy and regulation in Canada. G. Kane addresses the subject of consumer advocacy and regulatory commissions, relating actual experiences of the Consumers' Association of Canada before regulatory tribunals. E. Tyrchniewicz of University of Manitoba relates branch line abandonment and statutory grain rates on grain to Prairie regional development, suggesting that generally the importance of transportation in regional development is overrated, the issue of branch-line abandonment is quite insignificant and impact of changes in statutory rates is not entirely clear. M.S. Cohen, chairman of U.S. Civil Aeronautics Board, discussed the deregulatory effort and limited experiences with this procedure. H. M. Romoff of Canadian Pacific raises issues of dichotomy between theory and practice in transport. Relating this subject to actual corporate experience, he examines railway planning, the problems of managing an intermodal transportation company, and prospective financial realities of railways in the 1980s.

Volume 3, Fall 1978/Spring 1979. Text in both English and French.

Fosbrooke, R
Canadian Transport Commission 1979, 63 p.

ORDER FROM: Canadian Transport Commission, 275 Slater Street, Ottawa, Ontario K1A 0N9, Canada

DOTL RP

25 303264
CODE OF FEDERAL REGULATIONS. 49. TRANSPORTATION
No Abstract.

General Accounting Office PT 100-199, 1978, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

25 303265
A STUDY TO PERFORM AN IN-DEPTH ANALYSIS OF MARKET DOMINANCE AND ITS RELATIONSHIP TO OTHER PROVISIONS OF THE 4-R ACT
No Abstract.

Kearney (AT) and Company Incorporated Intrm Rpt. No. 2, Apr. 1979, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, 12th Street & Constitution Avenue, NW, Washington, D.C., 20423

25 303580
RAILVIEW: RATEMAKING REVOLUTION AT THE ICC
Revised ratemaking procedures by Interstate Commerce Commission in response to the 4R Act now find regulatory intervention only when needed to assure some public interest goal. In addition to allowing rates within a "zone of reasonableness," contract rates which were once regarded as illegal are now encouraged. The ability to adjust rates on captive traffic over which railroads have "market dominance" is also now being permitted. Other revised ratemaking procedures are also under consideration.

Christian, BJ (Interstate Commerce Commission) *Railway Age* Vol. 180 No. 21, Nov. 1979, pp 21-22

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25 303583
ARE SHIPPERS READY FOR RATE FREEDOM?
In reexamining "market dominance" of the 4R Act, both railroads and shippers may not have the experience in costing that coming deregulation with its attendent rate-making freedom will involve. J.S. Heuer of A. T. Kearney reports on a restudy of railroad competitiveness made for the ICC. Contract rates are seen as a major result of deregulation but many companies do not have a physical distribution management capability which is necessary for "regularizing" freight flow in volumes that justify special rates. It is found that there are very few "captive": shippers and that ICC should not make market dominance the focus of deregulation.

Railway Age Vol. 180 No. 22, Nov. 1979, pp 43-44

ORDER FROM: ESL

DOTL JC

25 303594
PRINCIPLES ON OFFICIAL CONTRIBUTIONS TO UNPROFITABLE PUBLIC TRANSPORT [Principer foer samhaellsstoed till olonesam kollektiv persontrafik]
The aim of this report is to analyse the present system of official contributions to the collective passenger transport in Sweden, how the responsibility for this transport is divided between the state, the county administrations and the communities, and to give an outline for a possible alternative. The report limits itself to the unprofitable regional and local

collective transport with the main emphasis on the railway traffic. The division of responsibility means a possible risk of factors other than traffic or socially economic governing the choice of transport means in the regional and local transport, as well as making the integration of a transport system within a region difficult. Also, the present system of contributions does not make possible a separation of different transport forms. The main advantages of the suggested alternative are: the same body decides the standard, the volume and the rates for the bus and the railway traffic. The head of the institution is responsible both for the planning and the expenditure, and the bus and the railway traffic have similar responsibilities regarding expenses. The contribution system becomes more neutral regarding choice of transport means and will be in harmony with the demand for the provision of transport. Unprofitable traffic on the two railway nets will be treated in a similar way. [Swedish]

Taken from Transportekonomi, Volume 1.

Dennelind, L Nelldal, B-L Olsson, L Smitterberg, E
Handelshoegskolan Volume 1, No Date, pp 201-224, 4 Fig., 5 Tab., 13 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 242536), National Swedish Road & Traffic Research Institute
ORDER FROM: Handelshoegskolan, P.O. Box 6501, Stockholm, Sweden
79.0443

25 303598
THE SWISS ROAD AND RAIL ACCOUNTS-BASIS OF TRANSPORT POLICY DECISIONS [Die Schweizerischen Strassen-und Eisenbahnrechnungen- Grundlagen fuer Verkehrspolitische Entscheidungen]

Within the framework of activities carried out in relation to overall Swiss transport policies special importance is given to the highways account, maintained since 1959, and rail account, established by a working party within the general transport commission. Both accounts are introduced and their methods are described. The economic viability of the highway account increased until 1961 and since then a decreasing tendency has been observed and as a result the capital account finished in 1974 in a negative situation for the first time (95% viability grading). The category accounts show, according to the capital account referred to, that middle and large size motor cars are economically viable, as are delivery vans. All other vehicle categories are not viable. Also the railway account is heavily in deficit, when seen from the economic view. [German]

Kaspar, C *Internationales Verkehrswesen* Vol. 30 No. 3, May 1978, pp 143-150, 2 Fig., 5 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 308321), Federal Institute of Road Research, West Germany
ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlerstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

25 303633
POLICY ON COMPETITION IN THE CONTROLLED SECTORS PARTICULARLY ENERGY, TRANSPORT AND BANKING [Politique de concurrence dans les secteurs reglementes et plus particulierement l'energie, les transport et les banques]

This report by the Committee of Experts on Restrictive Practices in Commerce was based on answers to a questionnaire sent out to all OECD Member Countries. After describing the objective aimed at, the report examines the limitations in application of laws governing competition in controlled sectors, then studies the general character of controls in the sectors studied, and lastly puts forward conclusions and suggestions for action. The report has three appendices, one of which is devoted to the transport sector: land transport (railway transport, road freight transport); transport by water; transport by air. [French]

Organization for Economic Cooperation and Devel UIC Cat. 01 N194, 1979, 216 p., 4 Tab., 116 Ref., 3 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

25 303634
ECMT. ROUND TABLE 42 (PARIS, 9-10 NOVEMBER 1978). INFLUENCE OF MEASURES AIMED AT LIMITING THE USE OF CERTAIN TRANSPORT MODES [CEMT. Table ronde 42 (Paris, 9-10 novembre 1978). Influence des mesures visant a limiter l'usage de certains modes de transport]

Report on the 42nd Round Table on Transport Economics, held in Paris on 9 and 10 November 1978. After discussing the influence of measures aimed at limiting the use of certain transport modes, the report gives a summary of the discussion on the scope of the restrictions, indicating fields of research to be developed; it then presents practical means of restrictions on interurban and urban traffic, and lastly considers certain possible measures such as spreading transport demand more evenly in time, improving public transport, and improving the freight services offered by the railways. [French]

European Conference of Ministers of Transport UIC Cat. 01 N193, 1979, 82 p., 7 Tab., 1 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

25 303664
RAILROAD DEREGULATION: MESSAGE FROM THE PRESIDENT OF THE UNITED STATES

No Abstract.

Government Printing Office 1979, 55 p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

25 303863
RAILWAY PRICING UNDER COMMERCIAL FREEDOM: THE CANADIAN EXPERIENCE

The Canadian experience since passage of the National Transportation Act of 1968 is detailed. The advent of agreed charges and the experience of railroads and shippers under this deregulation are discussed. The chapters: Rail Freight Traffic and Rates in Canada; Rate Making Institutions and Practices in Canada; Dynamic Competition Forces in Freight Transport; Market Competition as a Competitive Influence on Railroad Rates; Intermodal Competition as a Competitive Influence on Railway Rates; Intramodal Competition and Other Influences on Railway Rates; Regulatory and Governmental Influences on Railway Rates; Economic and Institutional Effects of Commercial Freedom and Competition in Canadian Rail Freight Transport; Conclusions and Implications for Regulatory Policy in Canada and Other Countries.

Heaver, TD Nelson, JC
British Columbia University, Canada No Date, 344 p.

ORDER FROM: British Columbia University, Canada, Center for Transportation Studies, Vancouver V6T 1W5, British Columbia, Canada

25 304161
TRANSPORTATION AND ENERGY. (COLORADO)

This report reviews the western states energy conservation symposium, Colorado state rail plan, and activities and recommendations of the Highway Legislative Review Committee.

Colorado Legislative Council RESEARCH PUB-238, Dec. 1978, 118 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-297228/9ST

25 304514
REVIEW OF RECENT INTERSTATE COMMERCE COMMISSION STAFF RESEARCH ON ENTRY CONTROL AND VEHICLE UTILIZATION

This National Transportation Policy Study Commission (NTPSC) report contains a review of selected staff research of the Interstate Commerce Commission (ICC) performed during 1977. The ICC work was believed relevant to the formulation of transport regulation. This paper presents recommendations for ways to redirect the focus of ICC research in order to provide an improved basis for policy analysis and decision making.

Roberts, M

National Transportation Policy Study Commission NTPSC/WP-79/02, Dec. 1978, 28 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-298690/9ST

25 304678
REVIEW OF POSSIBLE EFFECTS OF SOME SELECTED FEDERAL ACTIONS ON NEW TRANSIT PRODUCT INTRODUCTION

The main concern of the study is to evaluate the feasibility and effectiveness of new concepts and modification of existing concepts by which the Federal government can encourage the deployment of the most appropriate innovation in urban mass transit. In order to perform the study, information was gathered on the problems facing the innovation process and possible methods that could alleviate these problems. Fifteen concepts were examined by which UMTA could strengthen its role in the technology deployment phase of the innovation process. From the in-depth discussions based on a questionnaire with nine members of the transit industry, the transit operators identified uncertainty over future Federal design and performance guidelines as the single major barrier to new product introduction. The transit suppliers cited uncertainties over the stability and volume of annual product sales, opportunity costs of foregone investments, and lowest-bid procurement as their barriers. Of the 15 concepts, six were ranked as highly feasible and effective: (1) standard set of performance guidelines; (2) lowest life-cycle cost procurements; (3) Federal grants for the purchase and test of limited production quantities; (4) coordination of transit products orders by UMTA; (5) use of Federal capital incentives to influence local authorities to adopt regulations to encourage transit use; and (6) formation of a transit operators and supplies committee to facilitate greater cooperation in the development cycle. In-depth analysis was performed on the six selected concepts and examples of UMTA programs incorporating recommended concepts were discussed.

Chin, DK
Onyx Corporation, Urban Mass Transportation Administration, (UMTA-MD-06-0032) Final Rpt. UMTA-MD-06-0032-79-1, July 1979, 111 p.

Grant DOT-UT-80023

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-300965/1ST

25 304747
EVALUATION OF THE RATEMAKING PROVISIONS OF THE 4-R ACT

The study documents railroad industry and Interstate Commerce Commission activity under the ratemaking provisions of the Railroad Revitalization and Regulatory Reform Act of 1976. It updates data in the report sent to the Congress by the Department in October, 1977, as well as reports on activity under other rate related provisions of the Act. It provides a background of the Act and reports on activities in the areas of market dominance, the no suspend zone (yo yo) rates, seasonal, peak and regional (demand-sensitive) rates, rate incentives for capital investments, separate rates for distinct services, exemptions from regulation, adequate revenue levels, ICC filing procedures and rules of practice. It includes as appendices an inventory of market dominance cases, with descriptions and ICC case dispositions as of May 1, 1979, and an inventory of no-suspend zone (yo yo) rate filings by railroad, commodity and ICC case disposition as of May 1, 1979. The sources of information contained in the study are records, investigations and rulemaking proceedings of the Interstate Commerce Commission, articles published in the industry press and reports of the Department of Transportation.

Lago, AM McEnroe, JM Ramsdell, MJ
Ecosometrics, Incorporated, Asst Secretary for Policy, Plans & Internatl Aff Final Rpt. RR-132, DOT/P/50-79/23, Aug. 1979, 317 p.

Contract DOT-OS-80097

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB80-101413, DOTL NTIS

25 307657
ILLINOIS: AWAY FROM RAILROADING, INTO TRACK IMPROVEMENT

Illinois is transferring its state funding from operating subsidies for marginal rail lines to loans for rehabilitating secondary lines of existing carriers. Railroads and shippers are reacting positively to the new policy. Short line railroads are no longer seen as a solution for light-density operation, either by the state or shippers.

Malone, F *Railway Age* Vol. 180 No. 24, Dec. 1979, pp 31-32, 1 Phot.

ORDER FROM: ESL

DOTL JC

26 191297
TRANSPORTATION AND THE ELDERLY AND HANDICAPPED: A LITERATURE CAPSULE
This volume, one in a series initiated by the U.S. Department of Transportation, is intended to make the literature in transportation concerning the elderly and handicapped more accessible to decisionmakers in the community. It includes an introduction to the literature, selected summaries of five detailed studies in transportation for the elderly and handicapped, and an annotated bibliography. Literature selected for identification and annotation is organized according to five categories: overview, needs, programs, planning and policy. Approximately 100 citations are included that date from 1970, and an author index and a listing of suggested periodicals and other sources of information are provided. Five studies in transportation for the elderly and handicapped are detailed: (1) Transportation for Older Americans-The State of the Art, a comprehensive survey of the transportation problems of older Americans; (2) The Handicapped and Elderly Market for Urban Mass Transit, an evaluation of the urban market for mass transit alternatives to serve the elderly and handicapped; (3) Transportation for the Elderly and Handicapped-A Prototype Case Study of New York State Experience in Activating an Element of a Federal Grant Program; (4) Lincoln Experimental Transportation Demonstration Project, a study of various types of transportation services for elderly and handicapped residents in Lancaster County, Nebraska; and (5) Planning Handbook-Transportation Services for the Elderly, a manual for transportation planning methods and techniques.

Executive Summary available from PROJECT SHARE, P.O. Box 2309, Rockville, Md. 20852 as SHR-0002083/ES.

Department of Transportation Jan. 1977, 83 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

SHR-0002083

26 197895
FINANCING URBAN TRANSPORTATION. PART 1. GENERAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)
Financing methods are presented to show the various ways in which urban transportation systems can be supported by communities, metropolitan areas, and regions. Systems such as bus lines, subways, rapid rail, and taxis are discussed, as well as dial-a-ride operations and transit for the elderly. Some attention is given to urban airports, fare structures, and ridership. A few case studies are reported for specific cities if they would be of general interest to other areas. (This updated bibliography contains 86 abstracts, 5 of which are new entries to the previous edition.)

Kenton, E
National Technical Information Service Bibliog. May 1979, 95 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0423/8ST

26 197896
FINANCING URBAN TRANSPORTATION. PART 2. LOCAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)
The financing of urban transportation in local areas is documented. Although these studies may be of interest to a number of metropolitan localities, they were originally prepared to study the fiscal planning of transit and travel systems for specific areas. Cities covered include Atlanta, New York City, Washington, D. C., Philadelphia, Houston, Baltimore, San Francisco, Minneapolis, Milwaukee, and many smaller localities. Among the systems involved are rapid transit rail, bus, shared taxicab, dial-a-bus, dial-a-ride, and subway. Some attention is given to metropolitan airports. (This updated bibliography contains 184 abstracts, 8 of which are new entries to the previous edition.)

Kenton, E
National Technical Information Service Bibliog. May 1979, 193 p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-79/0424/6ST

26 301137
BIBLIOGRAPHY RAIL FREIGHT CAR UTILIZATION
This is a compilation of over 400 books, monographs and articles reflecting generally the attention devoted to car utilization during the 1970s. Citations are classified on the basis of carrier and shipper decisions and the actions of government and other regulatory agencies as they directly affect car utilization. Because some articles cover two or more aspects, they appear two or three times under different headings. In addition a series of statistical sources are cited.

Reebie (Robert) and Associates, Incorporated, Association of American Railroads AAR Rpt R-370, May 1979, 72 p., 1 App.

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

DOTL RP

Ongoing Research Summaries

00 059406
TRANSIT INDUSTRY INPUT ON THE TUNNELING TECHNOLOGY PROGRAM
The American Public Transit Association will provide transit industry input, advice, and consensus on the Tunneling Technology Program. A review program will be established to review each of the UMTA/TSC R&D Contracts. Each panel will be comprised of experienced technical representatives of the transit industry. The areas include subway system maintenance, subway station design and construction, and tunnel standardization, rapid transit concrete ties and rapid transit tracks.

Although under separate contract to UMTA, U.S. DOT, this project relates to ongoing research performed by the National Academy of Sciences' U.S. National Committee on Tunneling Technology.

PERFORMING AGENCY: American Public Transit Association
SPONSORING AGENCY: Urban Mass Transportation Administration, DC-06-0129
RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DOT-UT-60016T (CR)
STATUS: Completed NOTICE DATE: Aug. 1979 START DATE: July 1976 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: $49,054

ACKNOWLEDGMENT: TRAIS (DC-06-0129)

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: Mar. 1979 START DATE: Apr. 1972 COMPLETION DATE: June 1980 TOTAL FUNDS: $390,500

ACKNOWLEDGMENT: California Department of Transportation, Federal Highway Administration (111102353)

00 135514
RAPID ASSESSMENT OF ROCK MASS CONDITIONS
To develop a technique for the rapid assessment of the integrity of rock slopes, tunnel rock, dam abutments, and embankments. Thermal anomalies associated with known structural defects will be studied and their significance with respect to the behavior of the structure determined. Anomalies investigated will include loose tunnel rock, voids behind shotcrete and/or concrete structures, and leakage through dam abutments or embankments.

PERFORMING AGENCY: Waterways Experiment Station
INVESTIGATOR: Huie, JS
SPONSORING AGENCY: Waterways Experiment Station, DA0M8183

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZQA138183)

00 135658
SURCHARGE LOADING OF FLEXIBLE RETAINING WALLS
The objective of this study is to determine the earth pressure distribution on a flexile retaining wall subjected to a railroad surcharge loading. Classical earth pressure theories of Coulomb, Rankine, and Boussinesq lack experimental validation when used for predicting lateral surcharge earth pressures on flexible retaining walls. Two sheet-pile retaining walls, subjected to railroad loadings, are to be instrumented with earth pressure cells in an effort to directly measure the surcharge pressure distribution.

Common-Objective Study. This project is inactive until a sheet-pile wall becomes available for instrumentation.

PERFORMING AGENCY: New York State Department of Transportation, Engineering Research and Development Bureau, Study No 127-1
INVESTIGATOR: Pyskadlo, RM Renfrew, WW
SPONSORING AGENCY: New York State Department of Transportation; Federal Highway Administration, Structures and Applied Mechanics Division
RESPONSIBLE INDIVIDUAL: Burnett, WC New York State Department of Transportation Tel (518)457-5826 Sallberg Federal Highway Administration Norris Federal Highway Administration

HP&R
STATUS: Inactive NOTICE DATE: Jan. 1979 START DATE: May 1975 TOTAL FUNDS: $84,000

ACKNOWLEDGMENT: New York State Department of Transportation, Federal Highway Administration (147305353)

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: Woodbury, W Tel (202) 634-1145

Contract JO199025
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Mar. 1972 COMPLETION DATE: Dec. 1980

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: Woodbury, W Tel (202) 634-1145

Contract JO199030
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Dec. 1967 COMPLETION DATE: Sept. 1980

00 138477
EVALUATION OF REPAIR TECHNIQUES FOR DAMAGED STEEL BRIDGE MEMBERS
The first phase of this project will identify and categorize common types of accidental damage to steel bridges and the frequencies of their occurrence; analyze the state of the art of present practice and equipment used for assessing damage and repairing highway and railroad bridges and other steel structures (including heating temperatures, jacking methods, straightening tolerance and degradation of steel's mechanical properties and service life); evaluate techniques that have been applied or may be applied for correcting structural damage; preparation of report of Phase I and outline Phase II research.

PERFORMING AGENCY: Battelle Columbus Laboratories, NCHRP 12-17
INVESTIGATOR: Mishler, HW Tel (614) 424-6424
SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration
RESPONSIBLE INDIVIDUAL: Reilly, RJ Tel (202) 389-6741

NCHRP 12-17
STATUS: Active NOTICE DATE: May 1979 START DATE: Nov. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: $50,000

ACKNOWLEDGMENT: National Cooperative Highway Research Program

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. 1979 START DATE: 1973 COMPLETION DATE: 1985 TOTAL FUNDS: $30,000,000

ACKNOWLEDGMENT: UMTA

00 170632
FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES
Size effects shown by earlier ORE studies (D 86) are to be checked by fatigue tests on I beams and box girders, incorporating butt welds as made in a workshop and as made at a construction site. Tests also on smaller beams appropriate to use in cranes and vehicles (co-ordination with B 12) are made. Final tests to be under load spectrum (co-ordination with D 128). Object is to show possible inadequacy of some design rules for structures subject to fatigue. At this time constant amplitude tests on I beams and on box beams have been completed. Tests using load spectrum are still in progress.

Nine reports have been published to date. Question D130.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

00 170633
STATISTICAL DISTRIBUTION OF AXLE LOADS AND STRESSES IN RAILWAY BRIDGES
Calculation of the dynamic response of bridges under high speed train running (mathematical models, field tests, parameter studies, irregularities), traffic load induced bridge component fatigue (load and moment spectra are determined from traffic and track loading; counting methods, fatigue calculation). Estimates of life under given traffic were made. Traffic spectra have been derived from typical trains. Load spectra have been calculated for given single beams by means of influence lines. A method for calculating the moment range spectrum has been worked out. In the process, traffic and bridge parameters have been treated separately. Stochastic studies of the movement of a random individual load and of continuous loading on the bridge beam have been made. Measurements on bridges have been obtained for comparison with the calculations.

Seven reports have been published to date. Question D128.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1972

ACKNOWLEDGMENT: UIC

00 177845
UNDERGROUND LIFELINES IN A SEISMIC ENVIRONMENT
This research deals with the analysis and design of water distribution and transmission systems for earthquake effects. The aim is to develop rational and practical design procedures which can be used by utilities, governmental agencies and manufacturers in their design activities. Such procedures will involve various aspects of current technology, such as earthquake data, pipe damage statistics, analysis and design procedures, joint types, pipe materials, etc. The research will concentrate on underground water distribution lifelines. Specific research tasks include: studies of incoherent seismic motions, development of pipeline failure/damage criteria, experimental test planning, design decision analysis (to be performed by Columbia University as a project subcontractor), and preparation of design guidelines. Results will be made available in the form of a practical design methodology, including design curves, tables and formulas.

PERFORMING AGENCY: Weidlinger Associates, 7815049A01
INVESTIGATOR: Baron, ML Tel (212) 838-6849
SPONSORING AGENCY: National Science Foundation, Earthquake Hazards Mitigation Program, ENV76-09838 A01
RESPONSIBLE INDIVIDUAL: Baron, ML Tel (212) 838-6849

Contract 7815049A01

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1977 COMPLETION DATE: May 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 927 1)

00 179326
DEVELOPMENT OF DESIGN RECOMMENDATIONS FOR CONCRETE TUNNEL LINERS
The objective of this procurement is to develop guidelines and recommendations for structural design of concrete linings of underground structures based upon ultimate strength concepts of concrete behaviour. This concrete may be in the form of either precast segments, cast-in-place, or shotcrete; and may be either reinforced or unreinforced.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering
INVESTIGATOR: Paul, SL
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1504
STATUS: Active NOTICE DATE: Aug. 1979 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, Dunnicliff 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. 1980 START DATE: July 1978 COMPLETION DATE: Oct. 1980 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 four phases of the 40 month program are: I. Laboratory Research and Development; II. System Engineering Design; III. System Development, and; IV. Field Test and Demonstration.

PERFORMING AGENCY: Foster-Miller Associates, Incorporated
INVESTIGATOR: Maser, K Tel (617) 890-3200
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1516
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Dec. 1977 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: $2,088,391

ACKNOWLEDGMENT: TSC

00 179332
IMPROVED DESIGN PROCEDURES FOR UNDERGROUND SUPPORTS
The objective of this procurement is the development of an analysis design approach which uses the principle of optimization, can rationally handle ground-structure behavior and allows incorporation of improved knowledge on ground structure behavior whenever this becomes available.

Six final reports (Executive Summary & Vols. 1 thru 5) are currently being printed for distribution by March 1980.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Einstein, HH Tel (617) 253-3598
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Silva, LP Tel (617) 494-2351

Contract DOT-TSC-1489
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Jan. 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $97,000

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: Young, GA
SPONSORING AGENCY: National Science Foundation, Division of Applied Research, DAR 76-80044

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: $498,600

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 39)

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.

PERFORMING AGENCY: Bechtel Corporation; Haley and Aldrich, Incorporated
INVESTIGATOR: Sutcliffe, H Tel (617) 628-9600
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Nelson, RN Tel (617) 494-2032

Contract DOT-TSC-1570
STATUS: Active NOTICE DATE: June 1979 START DATE: Sept. 1978 COMPLETION DATE: June 1981 TOTAL FUNDS: $41,100,000

ACKNOWLEDGMENT: Bechtel Corporation

00 185235
DEVELOPMENT OF A RAIL PHOTOLOG
Ascertain requirements for field-inventory data for the existing rail system in Connecticut. Develop specifications for rail-photolog equipment. Purchase and test the specified equipment. Provide ConnDOT with a complete photolog file of the entire railway system in Connecticut.

PERFORMING AGENCY: Connecticut Department of Transportation, Bureau of Planning and Research
INVESTIGATOR: Bowers, DG Tel (203) 529-7741 X49
SPONSORING AGENCY: Connecticut Department of Transportation
RESPONSIBLE INDIVIDUAL: Dougan, CE Tel (203) 529-7741 X76

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: $120,000

ACKNOWLEDGMENT: Connecticut Department of Transportation

00 188669
SEGMENTED CONCRETE TUNNEL LINERS AND SEALANT SYSTEMS
The objective is to devise, fabricate, and test circular segmented liner systems displaying candidate joint configurations and sealants. The increasing cost of metal liner makes the development and use of precast concrete liner quite attractive. The weak link in a segmental concrete tunnel liner is the potential leaks that may arise at segment junctures.

PERFORMING AGENCY: Bureau of Reclamation
INVESTIGATOR: Spencer, RW
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Lamond, J Tel (617) 494-2544

Contract RA-76-22
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1976 COMPLETION DATE: Apr. 1980

00 188671
ASSESSMENT OF THE POTENTIAL FOR STANDARDIZATION IN RAPID TRANSIT SYSTEMS
The objective is to assess the potential for achieving construction cost economies in tunnel construction through the standardization of components and/or parameters which effect tunnel costs. This study is divided into two phases. Phase I will basically provide a detailed catalogue of the interacting components and engineering factors that have been shown to have a significant effect on tunnel planning, design, construction and operation. Phase II consists of an evaluation of the identified critical components and parameters to establish (a) specific components and/or parameters which are suitable for standardization, and (b) future work needs in the area of standardization.

PERFORMING AGENCY: Hampton (Delon) and Associates, Chartered
INVESTIGATOR: Hampton, D
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: May 1977 COMPLETION DATE: Aug. 1979

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: Active NOTICE DATE: Feb. 1980 START DATE: June 1978 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

00 196750
NATM ALTERNATIVE DESIGN FOR CONSTRUCTION OF MT. LEBAUM NATM ALTERNATIVE DESIGN FOR CONSTRUCTION OF MT. LEBANON
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: July 1979 START DATE: July 1979 COMPLETION DATE: Dec. 1981 TOTAL FUNDS: $460,000

ACKNOWLEDGMENT: FRA

00 196751
NON-DESTRUCTIVE TESTING FOR TUNNEL STRUCTURES
This project involves a comprehensive investigation of existing and new technology applicable/adaptable to testing tunnel integrity. A reliable "non-destructive" method of testing is to be developed. Such a method will be invaluable to old/existing subway systems in determining the structural integrity of old tunnels for development of rehabilitation or replacement programs.

PERFORMING AGENCY: Port Authority Trans-Hudson Corporation, NY-06-0072
INVESTIGATOR: Theofilos, LG Tel (201) 963-2701
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract NY-06-0072
STATUS: Active NOTICE DATE: July 1979 START DATE: Aug. 1979 COMPLETION DATE: Aug. 1981 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: July 1979 START DATE: July 1979 COMPLETION DATE: Dec. 1980 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, I
SPONSORING AGENCY: National Science Foundation, Division of Ad-

vanced Environmental Research & Technology, ENV75-20977
STATUS: Active NOTICE DATE: Dec. 1979 START DATE: June 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1582 2)

00 308310
INTEGRATED DESIGN/CONSTRUCTION FOR TUNNEL SUPPORTS
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. Included within this project is the development of an empirical design process, analytical approaches, improved interpretation of ground-structure interaction and on-site tunnel support testing program. The final results will include a simulation model and construction decision models based upon cost effectiveness and geologic parameters.

PERFORMING AGENCY: Massachusetts Institute of Technology, DAR-7709116
INVESTIGATOR: Einstein, HH Tel (617) 253-3598
SPONSORING AGENCY: National Science Foundation, Division of Applied Research
RESPONSIBLE INDIVIDUAL: Inderbitzen, AL Tel (202) 634-1617

Contract DAR-7709116
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Mar. 1978 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: $236,497

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: 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: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

00 308317
GROUND PENETRATING RADAR FOR TRACK FOUNDATIONS
In order to evaluate railroad embankments for the develpoment 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.

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: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978

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.

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: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978

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 & Communic, Can, Transit Systems Research and Development Office, 31217
INVESTIGATOR: Grouni, H Billing, JR
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can, Transit Systems Research and Development

STATUS: Programmed NOTICE DATE: Feb. 1980 TOTAL FUNDS: $56,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can

01 038973
RAILROAD TRACK STRUCTURES RESEARCH
The Federal Railroad Administration (FRA) and the Association of American Railroads (AAR), the contractor, enter into a program to perform specific Railroad Track Structures Research. The program is expected to encompass a number of tasks for research into a variety of technical factors affecting railroad track and related systems and subsystems. The Railroad Track Structures Research Program consists of Four Tasks: Mathematical Modeling, Ballast and Subgrade Material Performance Tests, Rolling Load Facility Tests and Track Research Laboratory Facility. Work continues only on the Rolling Load Facility Tests.
REFERENCES:
Technical Data Base Report (Task 2) July 1975, PB-251771
Functional Requirements for a Facility for Accelerated Service Testing (Task 4), Sept. 1976, PB-263605
Structural Model and Materials Evaluation Procedures (Task 2), Sept. 1976, PB-262987
Track Support Systems Parameter Study (Task 2) Sept. 1976, PB-263370
Finite Element Analysis of a Railway Track Support System-User's Manual (Task 2), Sept. 1976, PB-262988
Material Evaluation Study (Task 2) Jan. 1977, PB-264215
Lateral Stability of Ballast (Task 2) Sept. 1977, PB-275035
A Study of Railroad Ballast Economics (Task 2) Sept. 1977, PB-275102
Summary Report (Task 2) Ballast and Foundation Materials Research Program, June 1978, PB-282348
Track Structure Design Using Mathematical Models (Task 1), June 1978, PB-282357
Track Component Property Tests--Volume 1--Rail, Tie and Fasteners (Task 3), Nov. 1979

PERFORMING AGENCY: Association of American Railroads; Illinois University, Urbana, Department of Civil Engineering
INVESTIGATOR: Zarembski, AM Tel (312) 567-3622 Thompson, MR Tel (217) 333-3930
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Moody, HG Tel (202) 426-4377

Contract DOT-FR-30038 (CR)
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1973 COMPLETION DATE: Jan. 1980 TOTAL FUNDS: $823,097

ACKNOWLEDGMENT: FRA

01 038974
CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK. PHASE 3
The contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.
REFERENCES:
A Review of Measurement Techniques, Requirements and Available Data on the Dynamic Compliance of Railroad Track, Kaiser, WD 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: Sullivan, JH Tel (202) 426-4377

Contract DOT-FR-30051 (CPFF)
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1973 COMPLETION DATE: June 1982

ACKNOWLEDGMENT: TRAIS (PR# RP-39)

01 058458
FABRICATE, TEST, EVALUATE, AND DELIVER AN ULTRASONIC WHEEL PROBE INSPECTION SYSTEM
Objectives are: 1. To provide ultrasonic wheel probes for an ultrasonic inspection system which can detect all potentially dangerous defects. Particular emphasis shall be given to the detection of vertical split heads and the inspection of welded joints in continuously welded rail. The capabilities of these components will improve the detectability of ultrasonic inspection and also provide additional defect information needed to facilitate automatic data processing. 2. To test and evaluate the ultrasonic system in the field by comparing the inspection results with that of a magnetic inspection system.

PERFORMING AGENCY: DAPCO Industries, Incorporated
SPONSORING AGENCY: Transportation Systems Center, RR-519
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617) 494-2000

Contract DOT-TSC-995
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Apr. 1975 TOTAL FUNDS: $75,552

ACKNOWLEDGMENT: TRAIS (RR-519)

01 059223
STATISTICAL REPRESENTATIONS OF TRACK GEOMETRY
The objective is to conduct analyses of existing track geometry data in order to provide power spectral density and/or other statistical characterizations of the universe of track geometry conditions and to identify fundamental processes.

PERFORMING AGENCY: ENSCO, Incorporated
SPONSORING AGENCY: Transportation Systems Center, R6321
RESPONSIBLE INDIVIDUAL: Weinstock, H Tel (617)494-2000

Contract DOT-TSC-1211 (CPF)
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: May 1976 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $87,792

ACKNOWLEDGMENT: TRAIS (R6321)

01 059227
USE OF SURFACE ELECTROMAGNETIC WAVES TO DETECT RAIL JOINT FAULTS
The objective of this study is to determine experimentally the characteristics of surface electromagnetic waves (SEW)--transmission, reflection and radiation due to various defective and nondefective rail joints. These experiments are designed to verify the theoretical results for an ideal rail joint and to measure the effects of various perturbations of the rail joint. Also suitable techniques for coupling surface electromagnetic waves to the rail will be investigated. One outcome of this study will be a realistic evaluation of the applicability of the SEW technique to the detection of rail joint faults from a track-guided vehicle.

PERFORMING AGENCY: Missouri University, Rolla
SPONSORING AGENCY: Transportation Systems Center, R6357
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617)494-2000

Contract DOT-TSC-1217 (CR)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: May 1976 COMPLETION DATE: July 1977 TOTAL FUNDS: $56,690

ACKNOWLEDGMENT: TRAIS (R6357)

01 059295
TRACK GEOMETRY MEASUREMENT BY HIGH-RAIL VEHICLES
The need for increased track surveillance capability and data collection capability for transportation planning and rail assistance programming has led Iowa's Department of Transportation to purchase a high rail track geometry measuring vehicle. The objective is to examine the capabilities of this vehicle to assist in the improvement of track safety inspection and in data collection for transportation planning and assistance programming. The project will examine both technical and operational aspects of Track Geometry Car usage as an inspection device and as a data collection device.

PERFORMING AGENCY: Iowa Department of Transportation
INVESTIGATOR: Sherfy, MA Tel (515) 296-1222
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Liang, RT Tel (202) 426-1682

Contract DOT-FR-64243 (CR)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: June 1976 TOTAL FUNDS: $273,415

ACKNOWLEDGMENT: TRAIS

01 059371
IMPROVEMENT OF MAGNETIC TECHNIQUES FOR RAIL INSPECTION
The objective is to improve the magnetic inspection techniques through improvement of the sensing and signal processing methods. The opinion in

the railroad industry is that although the ultrasonic systems appear to have the greater potential, it requires further development before it can perform a thorough and complete inspection. Until these techniques are upgraded and proven in the field, magnetic inspection methods offer a good supplementary inspection. The intent is to improve magnetic inspection techniques and equipment so that the performance is improved when operated as an independent system or when providing supplementary support to ultrasonic systems.

PERFORMING AGENCY: Battelle Memorial Institute
SPONSORING AGENCY: Transportation Systems Center, R6345
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617)494-2000

Contract DOT-TSC-1244 (CPF)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Aug. 1976 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: $97,994

ACKNOWLEDGMENT: TRAIS (R6345)

01 059681
TEST AND EVALUATION OF THE TRACK GEOMETRY MEASUREMENT SYSTEM (TGMS)
The objectives are to: (1) Demonstrate the TGMS on the selected transit property. (2) Evaluate the TGMS under real world operating conditions on the selected transit property. (3) Collect track geometry data on the selected property. (4) Develop a Ways and Structures Maintenance Plan utilizing the TGMS. (5) Determine minimum requirements for real-time output from the TGMS to support Ways and Structures inspection under the Maintenance Plan, and identify the minimum component parts and operating characteristics of TSCs TGMS needed to achieve the minimum real-time output requirements.

PERFORMING AGENCY: Systems Technology Associates, Incorporated
SPONSORING AGENCY: Transportation Systems Center, R6732
RESPONSIBLE INDIVIDUAL: Nickles, JE Tel (617) 494-2204

Contract DOT-TSC-1285 (CPFF)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1976 TOTAL FUNDS: $305,215

ACKNOWLEDGMENT: TRAIS (R6732)

01 081797
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 1--TRACK STRUCTURES
Task objectives are development of recommended performance specifications and maintenance and geometric design guidelines for conventional railroad track and related track structures and components. This activity is intended to quantify the adequacy of a guideway that yields an acceptable level of ride quality and safety with minimization of first cost, maintenance costs, and secondary costs such as loss and damage, and wear and fatigue to vehicles. Task will recognize that load environment is a function of track parameters, wheel load, and level of maintenance. The Track Structures Dynamic Test Facility, developed under separate AAR/FRA contract, has the capability of determining the basic structures as affected by different subgrade materials, different types of ballast, various types of ties, spacing and rail sizes. A moving load allows for compaction of ballast subgrade material. Also sensitivity studies of track parameters, including basic alignment of the structure with such factors as minimum length of tangent between curves and deviation from theoretical line and surface, have been made using computer modeling techniques developed in Phase I.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Abbott, RA Tel (312) 567-3616
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

01 099369
OPERATION OF TEST TRACK AND RAIL INSPECTION EQUIPMENT
Because of the interdependence between each of the newly developed components for track and rail inspection, a critical test and evaluation must be carried out on each to assess its contribution to the total system. From the results of the tests and evaluations, an assessment of the developments can provide the information needed to generate work statements for future developments. In order to facilitate an effective test and evaluation, qualified technical personnel and testing facilities are required. The facilities primarily consist of an NDT laboratory, two test tracks, and a rail inspection vehicle. The NDT laboratory contains the instrumentation needed to perform the commonly used NDT techniques. The test tracks contain machined and natural rail defects on which inspection equipment can be tested up to speeds of 40 mph. The rail inspection vehicle is a hi-rail vehicle and currently uses ultrasonics exclusively to perform the rail inspection. The hi-rail vehicle provides the mobility required for a test vehicle and has ample space to house newly developed equipment. The staff presently consists of two technicians and two engineers.

PERFORMING AGENCY: Transportation Systems Center
SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research
RESPONSIBLE INDIVIDUAL: Ceccon, H Tel (617) 494-2000

In-House
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Mar. 1974

ACKNOWLEDGMENT: FRA

01 099378
IMPROVED INSPECTION, DETECTION AND TESTING RESEARCH
The objectives of this program are to provide engineering and field test support services to FRA-sponsored programs and to develop additional track inspection vehicles for the Office of Safety. In the process of collecting data for Amtrak, the Northeast Corridor Project and the Office of Safety, as well as for other FRA R&D programs, 260 tests on some 25 different railroads covered approximately 100,000 miles of track. The track geometry measurement system previously developed can now be utilized to detect safety-related defects. To provide the Office of Safety with three track inspection systems, an existing vehicle is being rebuilt and a new unit is being built.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Peterson, LA Tel 202-426-2965

STATUS: Active NOTICE DATE: Feb. 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. 1980 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. 1980 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138564
IMPROVED TRACK PERFORMANCE RESEARCH SUBPROGRAM
The Improved Track Performance Reseach 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. 1980 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 alinement 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 description of stresses required for prediction of rail degradation and rail failure due to fissures, split heads and bolt hole cracks; to assess design and operational trade-offs on thermal, flexural, residual and contact stresses and to provide input to a rail reliability model. The goal is an analytical model where factors in rail degradation may be determined.
REFERENCES:

Preliminary Description of Stresses in the Rail Joint Johns, TG; Davies, KB, Report FRA-ORD-76-294

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: Active NOTICE DATE: Feb. 1980 START DATE: June 1975 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: $429,000

ACKNOWLEDGMENT: FRA

01 148355
ROAD MAINTENANCE COST MODEL
The road maintenance cost model project has been directed towards the construction of a large computer model which will simulate the processes by which rail, ties and ballast in a length of track deteriorate under a selected traffic to levels which necessitate their periodic replacement. Incremental costs are to be determined by a routine that deletes each segment of the traffic mix in turn, converting the estimated service life differential to an appropriate annual charge which reflects the simulated "consumption" of the track asset. A second generation rail wear/cost model has been developed and is currently being used in a number of railway applications. Preliminary models for tie life and variability of other track maintenance costs have also been investigated.
REFERENCES:

Road Maintenance Cost Model Roney, MD; Lake, RW, Canadian Institute of Guided Ground Transport, Interim Report, Mar. 1977

Road Maintenance Cost Model Phase I-Rail Wear Modelling Roney, MD; Turcot, MC; Lake, RW; Schwier, C, Canadian Institute of Guided Ground Transport, May 1978

User's Manual-Rail Wear Cost Analysis Program-Rail Wear 2 Roney, MD; Birk, AM, Canadian Institute of Guided Ground Transport

Road Maintenance Cost Model-Final Report-Phase 3 Roney, MD; Birk, AM; Bora, B; Sui, D, Canadian Institute of Guided Ground Transport

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-833
INVESTIGATOR: Roney, MD Tel (613) 547-5777 Birk, M Lake, RW Sui, D
SPONSORING AGENCY: Canadian National Railways; Canadian Pacific Rail; Railway Transportation Directorate; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hanks, WG Tel (514) 877-5771 Tufts, LD Hawryszko, JW

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $184,000

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 170607
STANDARD SPECIFICATIONS FOR RAPID TRANSIT CONCRETE TIES-TEST AND EVALUATION
Preliminary specifications have previously been developed for the use of concrete ties for rapid transit. The purpose of this contract is to manufacture both monoblock and duoblock ties in accordance with these specifications and to laboratory test them following established test procedures. Based on the results of these tests, modified preliminary specifications will be developed.

PERFORMING AGENCY: Portland Cement Association, Construction Technology Laboratories
INVESTIGATOR: Hanna, AN Tel (312) 966-6200
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Witkiewicz, P Tel (617) 494-2006

Contract DOT-TSC-1442
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: $93,662

ACKNOWLEDGMENT: TSC

01 170616
TRACK STRENGTH CHARACTERIZATION PROGRAM
The purpose of the track strength characterization program is to develop a technique for the determination of the ability of track to withstand anticipated service loads and to utilize this technique for the development of recommended track strength requirements and/or wheel force restrictions for the different categories of track. This program will feature the ability to examine and classify existing tracks with non-destructive methods and with a minimum occupation of the track.
REFERENCES:

Preliminary Outline Track Strength Characterization Program, Zarembski, AM, Sept. 1977

Track Strength Characterization Task Plan May 1978

Measurement of Gauge Restraints: Rail Spreader Tests Zarembski, AM, Dec. 1978

PERFORMING AGENCY: Association of American Railroads Technical Center, K103
INVESTIGATOR: Zarembski, AM Tel (312) 567-3622
SPONSORING AGENCY: Association of American Railroads Technical Center
RESPONSIBLE INDIVIDUAL: Zarembski, AM Tel (312) 567-3622

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

01 170618
A THEORY FOR TRACK MAINTENANCE LIFE PREDICTION
Over a period of time, railroad track will settle as a result of permanent deformation in the ballast and underlying soil layers produced by traffic loading. After some period of time, maintenance will be needed to resurface and line the track. Suitable methods do not presently exist for predicting the maintenance life, which is a function of many factors. This study shall develop a theory for prediction of track settlement which is applicable to estimating maintenance life for new or existing track. The research approach,

focusing on the inelastic behavior of soil, involves: (1) establishing required characteristics for the track system components, (2) setting up a computer model, (3) studying the behavior of ballast and soil under representative cyclic loading, and (4) validating the model using available field experience, including data from FAST in Pueblo, Colorado.

PERFORMING AGENCY: State University of New York, Buffalo, Department of Civil Engineering
INVESTIGATOR: Selig, ET Tel (716) 831-3113
SPONSORING AGENCY: Department of Transportation, Office of University Research, Res & Special Program Admin
RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70058
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1977 COMPLETION DATE: Oct. 1979

ACKNOWLEDGMENT: DOT

01 170625
UNCONVENTIONAL TRACKS
Development of track on concrete base. Various types of rail fastenings are tested in laboratory and on concrete slabs of both in-situ and pre-cast construction. Noise and vibration measurements are made under dense traffic and at high speed. Results obtained from laboratory tests and test track at Radcliffe-on-Trent include vibration and noise comparisons. Apart from experience being compared from main line installations in France, England, Switzerland and Germany, ORE has sponsored tests under high speed at Oelde and tests on sharp curve under dense traffic at Velim. These tests have been completed. A new programme of work is being prepared. The summarizing report was presented to the ORE Control Committee in April 1977.

Seventeen reports have been published to date. Question D87.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1966

ACKNOWLEDGMENT: UIC

01 170636
UNIFICATION OF THE GEOMETRY OF POINTS WITH RAILS OF 60 KG/M PERMITTING HIGH SPEEDS ON THE DIVERGING TRACK
The object of this study is to obtain uniformity of turnouts and crossover design with 60 kg/m rails, especially those permitting high speed running on the diverging track. Test runs have been made with the SNCF measuring coach on the SNCF and DR track systems over points with different check rail entry slopes. Furthermore, tests have been made on crossovers of different designs for high-speed running on the SNCB, SNCF, SBB and DB systems. These measurements are now being evaluated. A switch with parabolic transition curve for 160 kg/m on the diverging track will be laid by the SNCF later this year.

Three reports have been published to date. Question D121.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

01 170649
OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC
The relationship between traffic and track geometry is studied, along with the optimization of levelling and alignment operations and a definition of track supporting structures is given. Reports RP 8 and 9 were submitted to the Control Committee in October 1976. The former report deals with the track in unloaded condition and the latter with the influence of some reinforcement parameters in the performance of the track with regard to level and alignment (processing of statistical data). The definition of track supporting structures is now the main task of the D 117 Committee. The corresponding programme of work was proposed in April 1976 and approved. It has five main points: (1) Study of optimum characteristics of formation materials; (2) Study of measures to be taken against contamination of materials; (3) Study of the mechanism of water penetration into the foundation; (4) Study of the influence of frost; and (5) General dimensioning rules. The first tests were made in the last three months of 1976.

Nine reports have been published to date. Question D117.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

01 170783
DOCUMENTATION AND TESTING OF MULTI-LINEAR PORTION OF FINITE ELEMENT PROGRAM FOR ANALYSIS OF TRACK STRUCTURE
The objective of the research program is the development of a three dimensional finite element program suitable as a tool for optimizing the design of a ballasted track structure. The work being carried out under the current contract involves the testing, debugging and validation of the linear portion of the computer program.

REFERENCES:
Analysis of Rail Track Structures (ARTS) User's Manual Raymond, GP; Turcke, DJ, Canadian Institute of Guided Ground Transport, Apr. 1978

Analysis of Rail Track Structures (ARTS) User's Manual--Revised Edition, Raymond, GP; Turcke, DJ; Siu, D, Canadian Institute of Guided Ground Transport, Jan. 1980

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-822
INVESTIGATOR: Turcke, DJ Tel (613) 547-5714 Raymond, GP
SPONSORING AGENCY: Transport Canada Research and Development Centre; Association of American Railroads Technical Center
RESPONSIBLE INDIVIDUAL: Rowan, WG Tel (514) 283-5068 Lundgren, JR Tel (202) 293-4182

Contract D-500-372-3
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $25,150

ACKNOWLEDGMENT: CIGGT

01 179328
TRANSIT TRACK SYSTEMS STUDY
The objective of this study was to evaluate and assess US rapid transit track conditions, design, construction and maintenance problems and practices, and to prioritize research requirements based on this evaluation, life-cycle cost analyses and cost-benefit analyses. As part of the contract, a workshop was held for the purpose of obtaining industry evaluation of the contractor's findings and to solicit recommendations for future research. The contract was completed with the contractor submitting recommended R&D areas for transit track.

REFERENCES:
U.S. Transit Track: Assessment and Research Needs UMTA-MA-06-0100-79-16, Dec. 1979

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-1502
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Apr. 1978 COMPLETION DATE: July 1979 TOTAL FUNDS: $225,678

ACKNOWLEDGMENT: TSC

01 179330
DEVELOPMENT OF DATA PROCESSING FOR AUTOMATIC RAIL FLAW DETECTION
This project will provide a feasibility report on real time digital signal processing and pattern recognition technology in the automatic detection and classification of rail defects. Magnetic tape recordings of ultrasonic transducer echos will be used to test the formulated algorithms.

PERFORMING AGENCY: Sperry Univac Computer Systems, 01 160047
INVESTIGATOR: Phipps, PL Tel (612) 456-4872
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Mould, JC Tel (202) 426-1682

Contract DOT-FR-8180
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 TOTAL FUNDS: $98,773

ACKNOWLEDGMENT: FRA

01 179337
FUNDAMENTAL PROBLEMS IN RAILROAD TRACK MECHANICS
The objectives of this research are threefold. (1) The derivation and validation of equations for the description of track response to mechanical and thermal loads in the lateral plane. In this, recently derived differential equations will be generalized by including geometrical nonlinearities and the effects of temperature change. To obtain the associated boundary and matching conditions the corresponding variational equation will be derived. Expressions for bending moment, shear and axial forces for the rail-tie system will be used for the physical interpretation of the obtained boundary and matching conditions. Due to errors caused by the transition from the difference equations to the lowest order differential equations for the tie spacings it is also planned to establish a formulation in terms of difference equations. (2) The same objective for the vertical plane. Due to errors of about 10 percent previously found for lateral track deformations caused by the limiting process which yielded differential equations from difference equations it is expected that a similar situation will also exist for the vertical case. Accordingly, a study similar to that in (1) above will be followed. (3) A critical survey of foundation models. This is to include elastic and viscoelastic models used for the analysis of continuously supported structures which have been introduced since 1964. These are to be analyzed in terms of their uniqueness and physical realism with a view toward establishing a sense of order and suitability for their use in the most recently developed analytical procedures.

PERFORMING AGENCY: Delaware University, Newark
INVESTIGATOR: Kerr, AD
SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG 78-25433

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1978 TOTAL FUNDS: $43,000

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 Tel (614) 424-4484
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: McConnell, DP

Contract DOT-TSC-1595
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: $465,545

ACKNOWLEDGMENT: Battelle Memorial Institute

01 188649
MAINTENNCE-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.

PERFORMING AGENCY: ENSCO, Incorporated, 437
INVESTIGATOR: Kenworthy, M 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: Aug. 1979 START DATE: Jan. 1978 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: $362,956

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. 1980 START DATE: Jan. 1979 COMPLETION DATE: May 1980 TOTAL FUNDS: $316,190

ACKNOWLEDGMENT: Association of American Railroads Technical Center

01 188667
DETERMINATION OF VEHICLE INDUCED FORCES ON TRANSIT TRACKS
The objective is to provide experimental data for validation of the analytical tools developed under previous efforts, to obtain engineering data on key parameters of the analytical models, to evaluate the applicability of the tools to define the load environments for design of the tie, fastener and ballast/subgrade components of a transit track structure and to illustrate their application through a pilot application to the track configurations currently existing on the transit test track at the DOT Transportation Test Center at Pueblo, Colorado.

PERFORMING AGENCY: Kaman AviDyne
INVESTIGATOR: Mente, LJ
SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: May 1980

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: Berger, IM Tel (212) 330-4366
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Nickles, JE Tel (617) 494-2302

Contract DOT-TSC-1635
STATUS: Active NOTICE DATE: Apr. 1979 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. 1980 START DATE: Mar. 1978 COMPLETION DATE: Dec. 1980

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: July 1979

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, H 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.

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: Active NOTICE DATE: Feb. 1980 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 compute 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.
See also RRIS 01A 188648; Bulletin 7902.
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

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 (Task 4)
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Aug. 1979 COMPLETION DATE: May 1980 TOTAL FUNDS: $95,257

ACKNOWLEDGMENT: FRA

01 308639
DEVELOPMENT OF GUIDELINES FOR THE USE, DESIGN AND INSTALLATION OF RESTRAINING RAIL ON TRANSIT TRACK
This research effort will identify and evaluate all of the significant factors relating to the use of restraining rails in rapid transit tracks (heavy rail systems) in the U.S. It will include operational, economic, and environmental considerations as well as dynamic forces and structural factors. The end product of the study will be guidelines intended to optimize design and installation of restraining rail.

PERFORMING AGENCY: ENSCO, Incorporated
INVESTIGATOR: Cunney, E 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. 1980 START DATE: Aug. 1979 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: $82,623

ACKNOWLEDGMENT: TSC

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. 1980 START DATE: July 1976 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: $1,900,000

ACKNOWLEDGMENT: FRA

02 058263
ROLL DYNAMICS UNIT/VIBRATION TEST UNIT FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY
The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Roll Dynamics Unit (RDU) and Vibration Test Unit (VTU) at the Transportation Test Center, Pueblo, Colorado. The RDL will permit analytical and experimental studies of railroad and transit vehicles, systems, and components in a controlled, reproducible lab environment with minimal risk to equipment and personnel. Through the study of vehicle dynamics in the RDL, the number of dynamic related accidents and derailments and their attendant costs should be reduced significantly. The contractor is responsible to deliver a functional RDU and VTU. The RDU will be capable of simulating speeds of approximately 200 mph and will accommodate vehicles up to 108 feet long, 12 feet, weighing 200 tons. The VTU will subject rail equipment to vertical and lateral vibrations experienced on typical track and handle vehicles up to 90 feet long, 12 feet wide and weighing 160 tons.

PERFORMING AGENCY: Wyle Laboratories
INVESTIGATOR: De Benedet, D Tel (303) 597-4500
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

Contract DOT-FR-64200
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: July 1975 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: $10,414,451

ACKNOWLEDGMENT: FRA

02 059427
FREIGHT CAR DYNAMICS RESEARCH PROGRAM
Develop mathematical models that may be used to understand the dynamic behavior of freight cars and the effects of various truck, car and track design parameters on their behavior. Validate these models with data gathered by the Track-Train Dynamics Program.

PERFORMING AGENCY: Clemson University
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Tsai, NT Tel (202)755-1877

Contract DOT-OS-40018 (CR)
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Nov. 1973 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $313,787

ACKNOWLEDGMENT: TRAIS

02 081799
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 2--WHEEL/RAIL
Overall task goals are to improve knowledge of the mechanics of wheel/rail interactions and to establish recommended performance specifications and design guidelines for wheels and rail. Task will involve applied research in wheel and rail metallurgy in order to determine requirements for improved performance. Research will also be conducted in stress analysis and fracture mechanics with the goal of developing improved design techniques and life cycle prediction methods. Stress analysis will especially concentrate on the contact stresses at the wheel/rail interface. Wear research conducted under Task 9, Advanced Analytical Techniques, will supply important input to this task. Rail corrugation, with initial effort by Canadian participants in TTD, has been studied. The rail stress analysis investigation, with particular effort on determining the stresses within rails as developed by passage of a vehicle, is progressing. In the wheel area, present effort is on developing an elastic-plastic stress analysis because mechanical and thermal stresses can go beyond the yield point of steel.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

02 081803
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 7--TEST MANAGEMENT
Task objective is to coordinate and conduct such tests as are necessary for the pursuit of Tasks 1-6 of Track Train Dynamics, Phase II. Task will provide clearinghouse function for data requests and will design and conduct appropriate laboratory and field tests.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Darien, NJ Tel (312) 567-3621
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

02 081805
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 8--PROGRAM ANALYSIS
The objective of this task is to assure economic justification of recommendations which result from research activities conducted in Tasks 1-6 of Phase II of the Track Train Dynamics Program. Task will include prior evaluation of research and implementation strategies to forecast potential economic benefits as an aid to priority determination. Areas selected for priority determination will be selected by program management. The principal technique for priority determination will be life-cycle costing based on data accumulated through existing industry channels supplemented by field surveys. Task will supply economic justification package for final recommendations based on industry status and forecasts and time of release.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: McGovern, WR Tel (312) 567-3617
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

02 099367
PILOT STUDY FOR THE CHARACTERIZATION AND REDUCTION OF WHEEL/RAIL LOADS
This project will be carried out in two phases, with the first phase developing a method for the analytic and experimental characterization of wheel/rail loads. In addition, this phase will provide a detailed program plan and a W/R load field measurement and data reduction plan for a specified track route that will then be implemented in Phase II. During Phase II, the W/R loads on selected track sections will be determined through implementation of the field measurement plan. These loads will be compared with those predicted through application of the analytical methodology. After modification and/or validation, the prediction method will be used to extrapolate W/R load data to alternative track, vehicle and operating conditions. This is intended to identify alternate strategies for reducing those W/R loads which are most closely associated with track degradation.
REFERENCES:
Evaluation of Analytical and Experimental Methodologies for the Characterization of Wheel/Rail Loads, Ahlbeck, D; Harrison, H; Prause, R; Johnson, M, FRA-OR&D 76-276, Intrm Rpt., Nov. 1976

PERFORMING AGENCY: Battelle Memorial Institute
SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research
RESPONSIBLE INDIVIDUAL: Weinstock, H Tel (617) 494-2459

Contract DOT-TSC-1051
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: July 1975 COMPLETION DATE: July 1979 TOTAL FUNDS: $583,000

ACKNOWLEDGMENT: FRA

02 099390
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS. PHASE II. TASK 10--SPECIAL PROJECT, LOCOMOTIVES
The objective of this task is to review accident statistics relating to derailments due to, or related to, locomotives for the purpose of determining whether or not six-axle locomotives are more prone to derailment than four-axle locomotives. Should the data reveal correlation between truck types and accidents, existing and/or newly developed computer models of locomotive trucks will be utilized for developing strategies for alleviating the problems.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Garg, VK Tel (312) 567-3596
SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Lind, EF Tel (312) 567-5790

STATUS: Active NOTICE DATE: Feb. 1979 COMPLETION DATE: 1979

ACKNOWLEDGMENT: AAR

02 128041
CALCULATION OF TRAIN AERODYNAMIC DRAG (FOR ENERGY MANAGEMENT PROGRAM)
The purpose of this project is to: 1. Calculate the steady and unsteady aerodynamic drag of vehicles in tunnels and free air. 2. Modify and/or develop computer programs for the calculation of the aerodynamic drag of vehicles as required by the energy management program. A literature survey and review of the aerodynamics of trains in tunnels under project 3603 is well underway. Also, a computer program has been acquired to estimate the unsteady aerodynamic drag of vehicles in tunnels. With this program, it is now possible to start to perform the drag calculations for the purpose of obtaining preliminary power profile and energy loss estimates. It is anticipated that the program will have to be modified to incorporate the latest information obtained in the literature review. This project covers the calculation of aerodynamic drag for the three cases of deep tunnel, cut and cover, and free air, and studies on propulsion systems with and without energy storage. The result, conceptual designs on a total energy basis. /RTAC/
A report is currently being drafted.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 3605
INVESTIGATOR: Colavincenzo, O
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 138469
TRUCK DESIGN OPTIMIZATION PROJECT, PHASE II
Phase II of the Truck Design Optimization Project (TDOP) will finalize the performance and testing specifications and economic methodology generated in Phase I; characterize the performance and economics of Type II, special service freight car trucks; develop performance and testing specifications as well as the economic methodology for Type II trucks incorporating wear and performance indices; provide related economic and analytical models of freight car trucks; and determine the feasibility of advanced designs and integrated carbody support systems.

PERFORMING AGENCY: Wyle Laboratories
INVESTIGATOR: De Benedet, D Tel (303) 697-4500 Cappel, KL
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Tsai, NT Tel (202) 426-0851

Contract DOT-FR-742-4277
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $2,639,100

ACKNOWLEDGMENT: FRA

02 139178
FACILITY FOR ACCELERATED SERVICE TESTING (FAST)
Accelerated life testing of track structures and certain components of rolling stock. A 4.8 mile loop of track, divided into 22 sections, with experiments on rail metallurgy, ties (hardwood, soft wood, concrete, steel), ballast (different materials, depths, shoulder width), etc. Four 2,000 HP locomotives pulling more than 80 cars (hoppers, tanks, flats) each grossing over 100 tons, at average speed of 42 MPH for a period not to exceed 16 hrs/day five day/week. Measurements taken during other 8 hours. Started operation in September 1976; approximately 415 million gross tons and 230,000 miles have been accumulated thru June 1, 1979. To date, more than 15 technical reports on various results at FAST have been published and several additional reports are currently in preparation.

PERFORMING AGENCY: Federal Railroad Administration, Office of Research and Development
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Association of American Railroads
RESPONSIBLE INDIVIDUAL: Spanton, DL Tel (202) 426-0850

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1976

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: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: $203,000

ACKNOWLEDGMENT: TSC

02 160409
LADING DAMAGE PARAMETERS
This project is aimed at the reduction of the current $300 million annual loss and damage in paid claims and the several billion dollar expense in support costs, unpaid claims and lost revenue. Testing of various product densities and shipments will be used to determine dynamic mechanical response lading parameters such as force constants and damping coefficients. Through analysis the response of various lading as it is influenced by vibration, variations in shipping containers and pallet configurations can be determined. The data will also be used in the development of predictive models to be used in optimizing the rail transportation system.

PERFORMING AGENCY: Rutgers University, New Brunswick
INVESTIGATOR: Morrow, D Tel (201) 932-3679 Richardson, G Vinatoru, M
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Orth, CL Tel (202) 755-1877

Contract DOT-FR-767-4323 (CC)
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $125,000

ACKNOWLEDGMENT: TRAIS, FRA

02 170591
EXPERIMENTAL DETERMINATION OF COEFFICIENT OF ROLLING ADHESION IN RAIL TRACTION AND BRAKING
The coefficient of rolling adhesion is strongly a function of speed and material, but also is influenced by other parameters, such as surface condition, curvature, traction or braking in the stress contact area. It has never yet been well-determined in these respects, and a VPI test rig of my design has now produced some definitive results never before achieved.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, 808440-1
INVESTIGATOR: Whitelaw, RL Tel (703) 951-6801
SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $67,000

ACKNOWLEDGMENT: Virginia Polytechnic Institute & State University

02 170595
TRAIN RESISTANCE
Investigations and analyses of rail freight train aerodynamic and mechanical resistances are being conducted to assist the FRA/OR&D in developing an overview of both near-term and long-range considerations of energy requirements for improved rail freight service. This effort will utilize results of on-going FRA aerodynamic research on various types of rail rolling stock and previous rail energy-related studies conducted by government and industry. Potential energy benefits resulting from freight car design or operational modifications will be assessed from technical and economic considerations.
REFERENCES:
Resistance of a Freight Train to Forward Motion Volume I Methodology and Evaluation, Muhlenberg, JD, Available at NTIS., FRA/ORD 78/04.I, Apr. 1978, PB-280969/AS

PERFORMING AGENCY: Mitre Corporation, Metrek Division, 1820 Dolley Madison Boulevard, 06.30.09.200
INVESTIGATOR: Muhlenberg, JD Tel (703) 790-6692
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

30000
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: FRA

02 170644
PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS
In April 1975 the B 55 Specialists Committee presented report RP 6 "Conditions for negotiating track twists. Calculation and measurement of important vehicle parameters" which gives guiding principles to the vehicle designer. These will enable him to examine new rolling stock for its safety against derailment on track twists as early as the design stage. In addition, the methods of measurement and the evaluation of the principal vehicle parameters are specified. It is planned to incorporate these conditions in the specifications and the programme of tests for new rolling stock. Further work of the Committee will aim at supplementing the recommendations given in report RP 6 by guiding principles for the cant dependent on the radius of the curve. This still requires the study of its effects on the guiding force. The studies were initiated by a detailed inquiry among the ORE administrations and they are, at present, continued by extensive tests on 2 administrations. Final report, RP 8, in preparation.
Seven reports have been published to date. Question B55.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1965 COMPLETION DATE: Apr. 1978

ACKNOWLEDGMENT: UIC

02 170645
BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURE
Study of braking and starting forces on bridges, is now expanded to interaction between long welded rails and bridges. Initial program included tests on plain line to evaluate magnitude and sequence of tractive and braking reactions, tests on steel bridges with and without ballast, and multiple span bridges, to develop theory and recommendations for code of practice. Tests on steel bridges and plain line together with theoretical studies have provided basis for provisional recommendations. Further work is needed to verify reactions on a bridge with continuous deck. The theoretical and experimental methods already developed by the Committee will contribute towards study of temperature reactions from long welded rails, and appropriate arrangements will be combined in future testing.
Twelve reports have been published to date. Question D101.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968

ACKNOWLEDGMENT: UIC

02 170648
INTERACTION BETWEEN VEHICLES AND TRACK
Track irregularity spectra, setting up a mathematical model (track and vehicle), specification of vehicle/track conditions for ensuring adequate contact, extending knowledge about the wheel/rail contact zone. At this time, work is being done on: 1. Further development and finalisation of the mathematical model for bogie vehicles; 2. Study of comfort standards; and 3. Optimisation of track parameters.
Eight reports have been published to date. Question C116.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

02 170657
EFFECT ON THE TRACK OF RAISING THE AXLE LOAD FROM 20 TO 22 T
It is intended to study the effect of raising the axle load through simulation tests and full scale tests on the Velim test loop. At this time track tests are at present being carried out in varying the values of different parameters such as rails, sleepers and ballast, and for each axle load. Ballast settlement tests are also being made for symmetric and asymmetric wheel loading. In addition, in cooperation with the B 142 Committee, tests are being conducted on the Velim loop with a test-train with 22 t axle load. A first series of tests, corresponding to 50 million tonnes of traffic, has now been terminated.
Question D141.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976

ACKNOWLEDGMENT: UIC

02 170660
PERMISSIBLE MAXIMUM VALUES FOR THE Y AND Q FORCES AS WELL AS THE RATIO Y/Q
The studies are being carried out in 3 directions: 1) Track displacement forces S: the quasi-static tests carried out at Bucharest on a specially fitted track are practically terminated as far as the bogie wagon is concerned and also the line tests with measurements of dynamic forces being carried out by FS, which will be continued by measurements on the test rig by PKP. 2) Criterion of derailment: new series of tests will be made in Derby and in Bucharest toward the end of the year and also on SBB. 3) Limiting values for Y and Q: The additional calculations and the practical work of verifying them will be undertaken by PKP and CFR.

One report has been published to date. Question C138.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

02 170661
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III
This phase contains new tasks not dependent on completion of Phase II work, as well as some of the longer range subtasks of Phase II that were not yet undertaken. The Phase III program, projected to cover a period of five years, has as its goal the development of requirements for advanced systems to meet the future needs of America's railroads as well as the introduction of advanced technology to improve the safety and reliability of present systems. The first stage of Phase III will last about two years and has four major tasks: TTD technology sharing and implementation; advanced design methodology development; train operation aids; and future system studies. 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 170666
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE II
The overall goal is development of recommended performance specifications and relevant design guidelines to assure the safety of railroad operations with current generation track and equipment. Although orginally programmed to end in 1977, many of its subtasks are not complete and some contracts will carry into and beyond 1978. Phase II work continues in these areas: Field testing, wheel/rail integrity studies, dynamic analysis, and specification guidelines. Field tests will complete wayside track data collection at six sites, implement an over-the-road load environment sampling with an instrumented six-car consist, measure wheel thermal/mechanical environment in typical revenue service, and use instrumented brake shoes in single-car stopping and drag brake testing. Wheel/rail integrity studies will publish findings of first-stage wheel/rail and centerplate laboratory wear research, determine residual stress states in rail, validate a risk model that relates rail inspection methods to probability of flaw propagation, develop cost-effective methods to detect damaged wheels. Dynamic analysis will complete final report on harmonic roll and bounce of freight cars due to track irregularities, complete the analytical representation and optimization of draft gear and cushioning units, evaluate results of auxiliary snubbing tests, complete evaluation of truck hunting, issue final evaluation report on instrumented-wheelset tests performed on Amtrak locomotive. Complete specifications for fatigue tests for couplers and truck bolsters; promote introduction of fatigue design guidelines and wheel stress limits into AAR specifications.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584
SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

02 179333
TIEDOWN OF NUCLEAR FUEL CASKS TO RAILCARS
An experimental program has been undertaken jointly by the Savannah River Laboratory (with DOE funding) and the Sandia Laboratories (with NRC funding) to investigate shock, vibration, accelerations, stresses, and tiedown forces in a cask-car system during car coupling operations. Results will be extended beyond the experimental range by analytical methods. A standard for tiedown of casks to railcars is to be developed.

PERFORMING AGENCY: Du Pont de Nemours (EI) and Company, Incorporated, Savannah River Laboratory
INVESTIGATOR: Petry, SF Tel (803) 824-6331 Magnuson, CF
SPONSORING AGENCY: Department of Energy; Nuclear Regulatory Commission
RESPONSIBLE INDIVIDUAL: May, GW Tel (803) 824-6331

Contract AT (07-2)-1
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: $315,000

ACKNOWLEDGMENT: Du Pont de Nemours (EI) and Company, Incorporated

02 188653
REVIEW AND SUMMARY OF COMPUTER PROGRAMS FOR RAILWAY VEHICLE DYNAMICS
Available computer programs are to be identified and categorized as the following: Lateral Stability; Curving Dynamics; Vertical Dynamics; Wheel/-Rail Contact Geometry and Force; Train Dynamics; Freight Dynamics and Analog/Hybrid Simulations. Authorities are to be selected for evaluation of each computer program group. Formats are to be developed for presentation of summaries and of results. Potential user of the railway vehicle dynamics programs are to be identified.

PERFORMING AGENCY: Virginia University
INVESTIGATOR: Pilkey, WD Tel (804) 924-3291 Reid, RE
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Tsai, NT Tel (202) 426-0851

Contract DOT-FR-8076
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1979

02 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

02 194540
AN ELASTIC LAYER RESTING ON AN ELASTIC FOUNDATION AND SUBJECTED TO A MOVING LOAD
This research program addresses a problem of current interest, namely the dynamic interaction between contacting elastic bodies. More specifically, it is directed toward modeling the wheel-railroad interaction problem. The mathematical formulation results in the solution of a mixed boundary value problem. This solution will be investigated for a range of material combinations, wheel force, and speed, yielding the relative normal displacement in the non-contact region and the contact pressure in the contact region.

PERFORMING AGENCY: Clarkson College of Technology, School of Engineering, Mechanical and Industrial Engineering
INVESTIGATOR: Adams, GG
SPONSORING AGENCY: National Science Foundation, Division of Engineering

STATUS: Active NOTICE DATE: July 1979 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $29,979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 5746 2)

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: July 1979 START DATE: Jan. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 303271
COMPUTER SCIENCE RESEARCH EQUIPMENT
This project is for the support of computer equipment for a set of diverse research topics. Among them are: (a) Signal Processing and Pattern Recognition of Ultrasonic Waveforms for the Nondestructive Evaluation of Materials; The principal objective of this research is to further investigate signal processing and pattern recognition procedures as they apply to classifying ultrasonic pulse echo waveforms obtained from flat-bottom holes and fatigue-crack specimens. (b) Real-Time Simulation in Rail Dynamic Research; The objective of this research is to develop comprehensive nonlinear rail vehicle simulations on the hybrid computer to provide more cost effective system analysis tools.

PERFORMING AGENCY: Clemson University, School of Engineering, Dept of Electrical & Computer Eng
INVESTIGATOR: Duke, AL
SPONSORING AGENCY: National Science Foundation, Division of Mathematical and Computer Sciences, MCS77-09360

STATUS: Active 791 NOTICE DATE: 192 START DATE: June 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: $62,800

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CQ 781)

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, T, TS-79-101, Feb. 1979

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can
INVESTIGATOR: Young, JA Tel (416) 248-3771 Apparao, T
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: $86,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can

02 308326
WHEEL/RAIL PROFILE MEASUREMENTS
A preliminary survey of the wheel tread and rail head profile characteristics for the Toronto subway system is being carried out. Precision measurement equipment (wheel and rail profilometers) have been designed and constructed for this purpose. Profile measurements have been made for 20 wheelsets and are planned for 40 rail sections (20 "new" and 20 "worn") on tangent track. Computer analysis of the resultant data will be used to establish typical values for wheelset effective conicity and gravitational stiffness for the subway vehicles.
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 & Communic, Can, Transit Systems Research and Development Office, 3117
INVESTIGATOR: Jackson, JD Tel (416) 248-3771
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can, Transit Systems Research and Development Office
RESPONSIBLE INDIVIDUAL: Jackson, JD Tel (416) 248-3771

STATUS: Active NOTICE DATE: Feb. 1980 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $30,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can

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: Active NOTICE DATE: Feb. 1980 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. 1980 START DATE: Sept. 1979 COMPLETION DATE: Sept. 1982

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: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: June 1971 COMPLETION DATE: July 1979 TOTAL FUNDS: $45,700,000

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.

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics
INVESTIGATOR: Wetenkamp, HR
SPONSORING AGENCY: Griffin Wheel Company

STATUS: Active NOTICE DATE: Mar. 1979 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-Light rail vehicle trucks to be developed by The Budd Company--starting with a retrofit version of the PCC car truck. Heavy rail and passenger truck also to be developed during 1979 and 1980.
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 Bexon, HJ Marvin, R

In-House
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Jan. 1971 COMPLETION DATE: 1980

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated, Dresser Transportation Equipment Division, Dominion Foundries and Steel, Limited

03 055916
IMPROVEMENT OF RAILROAD ROLLER BEARING CERTIFICATION TEST PROCEDURES AND DEVELOPMENT OF ROLLER BEARING DIAGNOSTICS
The problem of railroad roller bearing failure shall be reviewed giving consideration at a minimum to the effects of the following factors: 1. over and under lubrication. 2. loose bearing components (i.e. cap screws, seals, backing rings). 3. bearing component design. 4. adaptor condition. 5. rebuild procedures. 6. environment (speed, load, temperature). The interaction of factors leading sequentially to different modes of failure should be clearly established. An analytical model of the bearing may be useful in assessing the importance of interaction between these factors leading to bearing failure. Under a modification to the contract concepts for railroad roller bearing detection systems are to be evaluated. These systems are: 1. On-board Thermally Powered Transmitter Bolt; 2. Pulse Echo Ultrasonic Lubrication Detector, and 3. Shock Pulse Damage Detector.
REFERENCES:

Prevention of Roller Bearing-Initiated Burnoffs in Railroad Freight Car Journals, Final Rpt., FRA/ORD-78-16

PERFORMING AGENCY: SKF Industries, Incorporated
INVESTIGATOR: Allen, G Tel (215) 265-1900
SPONSORING AGENCY: Transportation Systems Center, RR-523
RESPONSIBLE INDIVIDUAL: Thompson, WI, III Tel (617) 494-2590

Contract DOT-TSC-935 (CPFF)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Oct. 1974 COMPLETION DATE: May 1979 TOTAL FUNDS: $113,885

ACKNOWLEDGMENT: TRAIS (RR-523)

03 081786
RAILROAD COUPLER SAFETY RESEARCH AND TEST PROJECT
Because of the recognition of a general lack of knowledge regarding the environment to which couplers and yokes are subjected because of the increased power from modern locomotives, higher operating speeds and increased use of high capacity cars, this project has as its objectives: (1) Study the operating and service conditions of couplers and yokes; (2) Investigate the technical, economic and safety aspects of coupler failures in service; (3) Evaluate standard coupler and yoke designs; (4) Prepare detailed guidelines for the proposed performance and test specifications for couplers and yokes; (5) Conduct a preliminary evaluation of current standard designs of coupler components under conditions listed in Item 4. Data has been acquired from instruments installed in a special test box car which has operated in various services. With service testing nearly complete, attention is now being given to laboratory tests required for recommendations for purchase and acceptance specifications. Fatigue and fracture toughness characteristics of steels used in couplers and the stress levels in the components must be determined. Agreement has been given to merge this project into Phase II of the Track-Train Dynamics Project, Task 5. All of the objectives of the Coupler Safety Project will be retained.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute
INVESTIGATOR: Morella, NA Tel (216) 229-3400
SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Morella, NA Tel (216) 229-3400

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: 1972

ACKNOWLEDGMENT: AAR

03 081787
RAILROAD TRUCK SAFETY RESEARCH AND TEST PROJECT
This project has the objective of developing guidelines for new specifications for truck bolsters and side frames to meet the increasingly strenuous

demands of rail freight transportation. 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 continues at the AAR Technical Center. This lengthy schedule is intended to broaden the experience base and to validate proposed guidelines for an interim bolster fatigue test specification. Such guidelines have been submitted to the responsible review bodies, for future inclusion in AAR specification requirements.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute
INVESTIGATOR: Evans, RA Tel (312)567-3598
SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Evans, RA Tel (312)567-3598

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: 1973 TOTAL FUNDS: $250,000

ACKNOWLEDGMENT: AAR

03 081798
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 3--TRUCKS AND SUSPENSION

Overall task objectives are the development of recommended performance specifications and test specifications for conventional three piece trucks. Specifications will be developed through a comprehensive research project built upon the RPI-AAR Railroad Truck Safety Research and Test Project and utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. Test specification development will involve determination of service loading and development of techniques necessary for predicting failure under dynamic loads. Task will also involve developing capability to fatigue test truck components. Field testing will include validation of the truck stability model developed by Clemson University and Arizona State University in conjunction with FRA and the TTD program. The model evaluates dynamic stability of a truck under a wide variety of service conditions and validation will enable it to be used in the study of phenomena such as truck hunting. The Harmonic Roll Series computer programs have been used to show how suspension characteristics could be matched with the vehicle to alleviate problems related to rock and roll and harmonic bounce.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Bulloch, R
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

03 081800
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 4--CAR STRUCTURES

Task objective is the development of recommended performance specifications and design guidelines for railroad freight car structures. Method will involve development of suitable fatigue analysis approach coupled with evaluation of advanced structural analysis methods. Task will include establishing test program goals for environmental loading tests to be pursued during the program. Test plans will be developed and tests conducted to validate fatigue analysis methods for car structural components. The basic approach adopted is a cumulative damage approach using the methodology which has been used in the aerospace and heavy-equipment industries. Development of interim guidelines using this methodology and presently available load spectrum and material fatigue performance was made available to TTD by ACF Industries. Further work in fatigue methodology and acquisition of additional load spectra from environmental sampling is progressing.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Zarembski, AM Tel (312) 567-3622
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: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

03 081801
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 5--COUPLERS, DRAFTGEAR, AND CUSHION UNITS

Task objectives are development of recommended performance and/or test specifications and design guidelines for railroad freight car couplers, draftgear, and cushion units. Task will build on current RPI-AAR Railroad Coupler Safety Research and Test Project and will utilize dynamic simulation computer models developed during Phase I of the Track Train Dynamics Program. Coupler effort will concentrate on stress and fatigue analysis. Draft gear and cushion unit efforts will be directed toward investigations of opportunities for improved train handling through optimized operating characteristics.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Punwani, SK Tel (312) 567-3601
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: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

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.

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. 1980

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. NAVSURFWPNCEN/WOL will develop, install and initiate in-service demonstrations of the Hot Journal Sensor (HJS) & the Local Derailment Detector (LDD)on a limited number of railroad cars. Hot box tests, over-the-road shock tests and normal bearing tests have been conducted on the Duluth, Missabe & Iron Range Railway at Duluth, Minn. Data from these tests will establish a design base for both the LDD and HJS. Laboratory testings has been conducted on a piezo-electric power source for an electro-explosive HJS device.

PERFORMING AGENCY: Naval Surface Weapons Center
INVESTIGATOR: O'Steen, JK
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

IA AR54162
STATUS: Active NOTICE DATE: Sept. 1979

ACKNOWLEDGMENT: FRA

03 136342
DESIGN OF AN ADVANCED CONCEPT TRAIN
Description: The object of this project is to demonstrate new concepts for the subway and commuter rail car industry. These concepts will reduce life cycle costs; increase passenger appeal; and reduce the impact on the environment. Two vehicles are being built for test and evaluation at TTC. The methods for reducing life cycle costs are: 1. An efficient propulsion system which stores the vehicle braking energy in a flywheel to be used later to accelerate the vehicle. All accessories are shaft driven from this flywheel. 2. Reliability-Designing for reliability and designing parts out of the vehicle. 3. Designing more maintainable equipment. 4. Reducing operating personnel by automaticity and closed circuit T.V. monitors. 5. Reducing track wear thru a better slip-slid control and better ride quality. Less environmental impact thru: 1. Reduced noise using composite wheels. 2. Less thermal emission since the braking energy is stored as rotational energy interferences due to advanced propulsion design.

PERFORMING AGENCY: AiResearch Manufacturing Company; Boeing Vertol Company
INVESTIGATOR: O'brien, T
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Mar. 1972 COMPLETION DATE: Feb. 1979

03 138537
GAS TURBINE-ELECTRIC (GT-E) COMMUTER CARS
The objective is to develop advanced dual powered commuter cars capable of gas turbine or electric propulsion which is equivalent to all-electric car performance, and can provide a no-change ride to suburbs beyond electrified territory. Four GT/E cars were built by General Electric and four by Garrett AiResearch. Two Garrett cars were tested briefly at the DOT Transportation Test Center, Pueblo, Colo. All eight cars were tested in non-revenue service beginning in 1975 on the Long Island Rail Road, and entered revenue service in 1976 for a 12 month evaluation period.

Subcontractors are Garrett AiResearch and General Electric Company and Louis T. Klauder and Associates.

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0005
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. 1980 START DATE: July 1971 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $14,800,000

ACKNOWLEDGMENT: UMTA

03 138539
ADVANCED SUBSYSTEMS DEVELOPMENT PROGRAM (ASDP)
The objective of this investigation, a part of the Urban Rapid Rail Vehicle Systems Program, is to achieve transit vehicles that are as reliable, safe and economical as possible, choosing subsystems which reduce the cost of operation and maintenance, reduce energy requirements and/or improve safety, comfort and performance. The components chosen for detailed development are the self-synchronous a-c traction motor, the monomotor truck with active suspension and the synchronous spin-slide control braking system with improved emergency stopping capability.

Subcontractors are Delco Electronics, Budd Company and Westinghouse Air Brake Division.

PERFORMING AGENCY: Boeing Vertol Company
INVESTIGATOR: O'brien, T
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Dec. 1976 COMPLETION DATE: Jan. 1980 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. 1980 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: Active NOTICE DATE: Aug. 1979 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. The contractor will perform a series of tasks including one requiring the development of a minimum number of car performance and dimensional specifications which collectively bracket future transit industry requirements.
REFERENCES:
Determination of The Optimal Approach to Rail Rapid Transit Car Standardization, Morris, R, Available at NTIS, UMTA-IT-06-0131-76-1 131 pp, 1976, PB-259-363

PERFORMING AGENCY: Decision Group, IT-06-0175
INVESTIGATOR: Morris, RE Tel (703) 827-0227
SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment
RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090

Contract DOT-UT-70043
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1977 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $1,200,000

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: Active NOTICE DATE: Aug. 1979 START DATE: May 1976 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $140,000

ACKNOWLEDGMENT: American Public Transit Association

03 170604
URBAN RAPID RAIL VEHICLES AND SYSTEMS PROGRAM PHASE IV
The Urban Rapid Rail Vehicles & Systems (URRVS) Program includes two parallel efforts. One activity is directed towards completion of the Advanced Concept Train (ACT) and the other activity supports the Advanced Subsystem Development Program (ASDP).

PERFORMING AGENCY: American Public Transit Association
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60060
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: May 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: $389,309

ACKNOWLEDGMENT: American Public Transit Association

03 170608
ENGINEERING DATA FOR CHARACTERIZATION OF RAILWAY ROLLING STOCK AND REPRESENTATIVE LADINGS AND WHEEL PROFILES
This contract will provide engineering data to characterize the fleet of U.S. railway rolling stock, representative ladings and wheel profiles, for the range of freight, passenger and locomotive vehicles in current use or proposed for use in the near future. This data is intended primarily for use in parametric studies of rail vehicle/track system dynamic interactions, and may also be useful to freight systems studies. The efforts of the contractor are expected to result in 1. A characterization of the U.S. freight vehicle fleet in terms of a moderate number of dimensionally similar vehicle categories and reduced number of generic vehicle families expected to have similar dynamic response characteristics; 2. Definition of major categories of locomotives and passenger vehicles; 3. Definition of truck configurations, coupler and representative lading data 4. Engineering parameter descriptions for the above items 5. Population data on major freight, passenger and locomotive groups 6. Descriptions of representative in-service wheel profiles for freight vehicles.

PERFORMING AGENCY: Pullman-Standard Car Manufacturing Company, Champ Carry Technical Center
INVESTIGATOR: Johnstone, B Przybylinski, P
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Di Masi, FP Tel (617) 494-2210

Contract DOT-TSC-1362
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: June 1977 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: FRA

03 170617
PERFORMANCE LIMITS OF RAIL PASSENGER VEHICLES
The objective of this research is to identify the dynamic performance capability of conventional and innovative passenger truck designs. As a part of this objective, the best performance capability of generic optimum passive passenger trucks, employing conventional wheel-sets, will be established so that specific truck designs may be compared against the general optimum design. The research consists of defining, in an engineering sense, the performance boundaries (hunting, curving, derailment, ride quality, wheel-track force levels, etc.) of current and proposed passenger truck configurations. This work will compare the performance of conventional passenger trucks, optimized conventional trucks and new truck designs (e.g. the radial truck), to determine the performance limits of each class of passenger trucks.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Mechanical Engineering
INVESTIGATOR: Hedrick, JK Wormley, DN Richardson, HH
SPONSORING AGENCY: Department of Transportation, Office of University Research, 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 170630
WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDISATION
Standardization of wheelsets with assembled journal bearings. Maintenance recommendations. Standardization of axles. Comparison of calculation methods. Comparative study of various types of roller bearings. Study of current flow through roller bearings. Fixation of brake discs on small wheels. Present state; (1) Standardisation of wheelsets with assembled journal bearings: a. Field tests on wheels of 920 mm 0 will be continued up to end of 1977. b. Tests on wheels of 1,000 mm 0 according to B 136/RP 2 have been commenced. c. Studies and tests for wheelsets fitted with small wheels are being carried out. Standardisation of axleshafts and fixation of brake discs on small wheels will also be dealt with here. (2) Establishment of a calculation method applicable to future standard wheelsets and recognised by the Member Administrations. The first interim report B 136/RP 3 was approved on October 1976. A full report B 136/RP 6 will be presented in April 1978. (3) Studies of maintenance methods for wheelsets with assembled axleboxes used by the different Administrations; report B

136/RP 7, October 1978. (4) Study of current flow phenomena. Inquiry results being evaluated; Report in April 1979. (5) Study of standardization of dimensions of roller bearings is being made with an inquiry (April 1978).

Six reports have been published to date. Question B136.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973 COMPLETION DATE: 1979

ACKNOWLEDGMENT: UIC

03 170638
STANDARDISATION OF AIR-CONDITIONING AND HEATING INSTALLATIONS

With the delivery of the Eurofima prototype standard passenger coaches the B 107 Committee has been given an opportunity to study, in conjunction with the B 108 Committee, different air-conditioning systems (single and twin duct systems) installed in virtually identical coaches. Relevant measurements were taken in accordance with a test programme worked out by a joint group of the two Committees B 107 and B 108, the tests being carried out at the Vienna Arsenal Climatic Chambers. The results of these tests are described in the report B 107/RP 4 of October 1975. Further studies concern the interchangeability of given parts of air-conditioning systems and the improvement of the air distribution in the compartments.

Four reports have been published to date. Project B107.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

03 170639
CONDITIONS WHICH SHOULD BE COMPLIED WITH BY WAGON COMPONENTS FOR 22 T AXLE LOAD

Study concerning the adaptation of the present cars to an axle load raised from 20 to 22 t. Theoretical and tentative analysis of the structural elements of the car liable to affect directly the operational reliability and fatigue strength at increased axle loads. In the spring and summer of 1976, measurements were made on some test wagons at the PKP. In December 1976, a test train was subjected to fatigue tests on the test loop at Velim (in cooperation with the D141 Committee). At the beginning of May, the distance run by the test train was estimated at 20,000 Km (1st series with an axle load of 22 tons).

Question B142.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976

ACKNOWLEDGMENT: UIC

03 170641
ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTRE BUFFERS)

Research, comparison and development of elastic systems for current and future traction and shock systems. Devices to protect the load (long-stroke shock absorbing systems, other means); preparation of leaflets for elastic systems and long-stroke shock absorbing systems. Acceptance testing of spring systems. Comparative tests with representative specimens of the five families of elastic systems have been concluded. All the results have been summarised in a report (RP 14). A joint leaflet has been prepared which will also include the special conditions for the friction cone, hydrodynamic compression and hydrostatic compression families of elastomers (from reports B 36/RP 12 and 13). The acceptance procedure for elastic elements has been initiated; the "ring spring types B 412B" (RP 16) and "B 412A" (RP 17) have been accepted; acceptance of types Jarret DC 13, Rheinmetall 129-11U and Sagem 12054 is in progress. Testing of load protecting devices (so far dealt with in reports No. 10, 11 and 15) is still to be completed. A leaflet for long-stroke shock absorbing systems has been prepared (RP 18). A joint UIC/OSJD leaflet is being prepared for an elastic system for passenger coaches (all elastic elements between two coupled coaches). Theoretical calculations are in progress for elastic systems dependent on speed.

Eighteen reports have been published to date. Question B36.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1959

ACKNOWLEDGMENT: UIC

03 170643
TESTS ON AUTOMATIC COUPLING

Work has continued to perfect the automatic coupler for wagons, chiefly regarding the interchangeability of various sub-assemblies and the design of the operating components. The engineering work on the automatic coupler for wagons has been completed in time. The revised complete set of drawings for the production of the automatic coupler is available. A rather large number of these couplers are already in use in trains on scheduled services to gather more findings on the wear characteristics and maintenance conditions. In this connection, trains with a total mass of about 5400 tonnes are also being equipped for ore traffic; they were placed in operation early in November 1976. Tests in progress on revenue earning services on the system of various administrations which, in to some extent difficult operating and climatic conditions, are being made with trains of a total mass of up to 5000 tonnes and fitted with couplers of the 1969 type will be continued. Studies covering the final design of the automatic coupler for passenger coaches have been completed. Some details of this coupler vary from that for wagons to do justice to the special conditions of a modern passenger coach; direct coupling with the automatic coupler for wagons in ensured. The first couplers will be supplied during the period ending 1977/beginning 1978. Preliminary tests will then be carried out immediately. The Specialists Committee is taking part in a large number of other studies: devices on the head stocks of wagons, installation drawings and automation questions connected with the automatic coupler.

Twenty reports have been published to date. Question B51.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Lang, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968

ACKNOWLEDGMENT: UIC

03 170646
STANDARDISATION OF PASSENGER CARS

Inquiry report B 106/RP 1 "Design of passenger accommodation" was presented in October 1971. In conformity with the decision of the 79th meeting of the ORE Control Committee in April 1977, application will be made to UIC to include question S 2031 "Permissible stresses on internal and external parts of passenger coaches" in the B 106 programme of work. Setting up a Specialist Committee B106 had been deferred until the bases for producing a program of work have been provided.

One report has been published to date. Question B106.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

03 170647
UNIFICATION OF ELECTRICAL EQUIPMENT FOR PASSENGER COACHES

Standardization of given electrical equipment of passenger coaches such as batteries, lighting, switch boards and instrument cabinets, remote control system for lighting and doors. In connection with the air-conditioning test being carried out by the B 107 Committee, the B 108 Committee is testing power supply systems in the same coaches. These tests cover several (380 V three-phase a.c., 50 Hz and 1000 V d.c.) with rotary transformer as well as systems with a static converter. The results of these tests were published in report B 108/RP 3. Further studies will serve to standardise the electrical equipment of passenger coaches, such as relays, safety fuses, lighting, batteries.

Three reports have been published to date. Project B108.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

03 170654
MODERN SUSPENSION SYSTEMS FOR TWO-AXLED WAGONS
The Specialists Committee made extensive strength and running tests with several selected solutions for existing suspension designs, which were assessed according to specified criteria and, taking as a basis the results of the studies and the tests, presented in April 1976, a proposal for a vertical type of progressive suspension system for two-axled wagons in service (B 13 4/RP 1). Operating tests concerning these solutions, and also studies regarding the profitability and suitability of this wagon for taking an axleload of 22 t, will be continued with a view to preparing a standard solution proposal. Completion of this work is expected in 1977. In addition, studies with newly developed progressive suspension systems for future two-axled wagons were initiated.

One report issued to date. Project B134.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1975 COMPLETION DATE: 1977

ACKNOWLEDGMENT: UIC

03 170658
NON-POLLUTING SANITARY INSTALLATIONS
In view of the doubts existing among passengers and authorities concerning the hygienic conditions of toilet systems installed in railway coaches (as a result of which several Administrations have already tested new solutions and suggested possible improvements) an examination is being made of the present position and of possible improvements. The differences in purchasing and maintenance costs for different variants of non-polluting toilets have also been established. The inquiry report B 140/RP 1, was approved by the Control Committee in October 1975. In accordance with the suggestions of the report, the rapporteur was asked to continue his work of observing the tests being made by the different administrations and to prepare a new report within two years. The second enquiry report was approved in October 1977. A Specialists Committee which presented its programme of work and Action Sheet to the Control Committee in October 1977 has meanwhile been set up.

Two reports have been published to date. Question B140.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1974

ACKNOWLEDGMENT: UIC

03 170659
NON-DESTRUCTIVE EXAMINATION PROCEDURES
The E 139 Committee is studying the standardisation of non-destructive examination procedures for the acceptance testing of running gear at the works. It has initiated its studies by ultrasonic tests in the laboratory on axles; the results are now being evaluated; magnetoscopic tests are in progress. Ultrasonic tests on wheel tyres and solid wheels, which had been collected on various railways were made. A Working Group is preparing a list of expressions used in ultrasonic and magnetoscopic examinations. The E 139 Enlarged Committee, with the participation of representatives from 8 suppliers as Invited Specialists, had been set-up and had held its first meeting.

Question E139.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

03 170665
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 4--FUTURE SYSTEM STUDIES
This task will evaluate critically future rail systems options, needs and proposed advanced-concept proposals in order to assess their potential for safe, cost-effective operation to provide direction and priorities for developments of the second stage of Phase III. The subtasks: (4.1) Compile a list of present and future test facilities and match these with future TTD requirements; (4.2) Investigate problem areas in current braking systems, including use of pneumatic system simulation models; (4.3) Survey the scope of options for development of hardware systems from a standpoint of future market opportunities and constraints; (4.4) Explore the engineering economics of car size and include the wheel-load/rail-wear relationships; (4.5) Catalog and evaluate currently proposed advanced concepts and development efforts for couplers, brakes, trucks and other components.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Punwani, SK Tel (312) 567-3601 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 freight cars (vehicles, subassemblies and parts) is being achieved in accordance with decisions of the Joint Meeting of the 4th/5th Committees of UIC--Operating and Rolling Stock and Motive Power. Test specifications and test programs are being developed. Plans are also made for adaption of operating rolling stock to receive the automatic coupler. Designs of eight types of cars, including three for transporting containers, have been completed with drawings. The ninth and tenth types to be standardized will be complete in 1978, an eleventh in 1979 and work on the 12th type is being undertaken. Standardization of car components is also progressing. To date a welded car truck, a cross gangway and 20-ft ISO container have been completed. Work on two other truck designs is to be concluded in 1978. Preliminary work on car ends and on the mechanical components of the brake system is also proceeding. Test programs are being developed; current attention is directed at leaf springs, fatigue strength of cars and buffing test conditions.

Twenty seven reports have been published to date. Project B12. An extended edition of report B12/RP17 has been published.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

03 179688
IMPROVED AIR DELIVERY SYSTEMS FOR MECHANICALLY REFRIGERATED RAILCARS
Determine feasibility of through-the-load air circulation in railcars, effect of heavier loading on cooling rates and fruit quality. Determine type, size, and location of vent holes in boxes and slipsheets required for improved air circulation in tightly-stacked unitized loads. Stationary tests will be conducted to determine which of three air distribution systems and stacking patterns will give more rapid and uniform cooling of fruit. Paired shipping tests with citrus will then be made from California to eastern markets in conventional and modified railcars with the experimental systems. Condition of shipping container and product in a solid-stacked, in-register, and conventional pattern will be compared. Refrigeration equipment performance, cooling rates, and condition of product will be monitored in transit and evaluated. Costs of handling equipment, materials, and labor will be obtained to determine potential savings from unitized and palletized handling compared with conventional handling of individual boxes.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-008
INVESTIGATOR: Kindya, WG
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Feb. 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. A study was made of a river terminal grain storage elevator in Kansas City for the purpose of developing a description of the basic equipment and sequence of flow of grain in a typical terminal elevator. Data developed in the study will be published in a report describing the present system of handling, transportation, and storage involved in moving grain from the farm to the processor in the United States and overseas. Since there is presently no substantive literature describing the present system, identifying its main characteristics and problems, it was decided to develop information for such a report as a necessary first step in the research to determine the feasibility of a containerized storage, transport, and handling system for grain.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-006
INVESTIGATOR: Guilfoy, RF, Jr
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: July 1979 START DATE: July 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043920)

03 185234
PLAN AND ESTABLISH A TRANSPORTATION EQUIPMENT RELIABILITY PROGRAM
TRIP is a government-initiated response to an acknowledged need to collect and analyze national transit equipment reliability information. The information generated will be disseminated to the transit operating industry, equipment suppliers, and federal organizations in order to define reliability problem areas, evaluate improvements, upgrade maintenance, improve equipment service and reduce cost. TRIP will cover rail vehicle reliability data and consists of two phases: Phase I covers the planning, designing, and testing of a small scale transit reliability data bank for a select group of rail vehicle components. Phase II is the establishment and operation of a full scale railcar and bus reliability Data Bank.

PERFORMING AGENCY: Dynamics Research Corporation
INVESTIGATOR: Limpert, SB Tel (617) 658-6100 Silvia, PJ De Salvo, SM
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Robichaud, RH Tel (617) 494-2302

Contract DOT-TSC-1559
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: $538,390

ACKNOWLEDGMENT: Dynamics Research Corporation

03 188652
TRANSIT RELIABILITY INFORMATION PROGRAM (TRIP)
APTA will provide transit industry input, advise, and consensus to U.S. DOT-TSC and its contractor in their work to increase the operational reliability of transit equipment. Initial effort of TRIP is to develop an Experimental Data Bank (EDB) for analyzing reliability of selected components used on Heavy Rail Rapid Transit Cars. The EDB will serve to validate the basic concepts of TRIP. Application of the TRIP concepts will be eventually expanded to all transit car and wayside equipments including that used for fare collection, power, signalling, control, and communication.

PERFORMING AGENCY: American Public Transit Association
INVESTIGATOR: Gordon, TS Tel (202) 331-1100
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Robichaud, RH Tel (617) 494-2302

Contract DOT-TSC-1615
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1978 TOTAL FUNDS: $20,954

ACKNOWLEDGMENT: American Public Transit Association

03 188657
RADIAL-AXLE PASSENGER CAR TRUCKS
Design and production of a self-guided radial-axle passenger car truck capable of operation at speeds of 125 mph. Based on the Scheffel cross-anchor design, the non-powered version will be installed under Amcoach equipment for extended testing at Transportation Test Center.

PERFORMING AGENCY: General Steel Industries, Incorporated; Buckeye Steel Castings
INVESTIGATOR: Jackson, KL
SPONSORING AGENCY: Federal Railroad Administration, Office of Passenger Systems Research and Development; National Railroad Passenger Corporation
RESPONSIBLE INDIVIDUAL: Delousy, C Tel (202) 426-0966

STATUS: Active NOTICE DATE: Aug. 1979

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: June 1979 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 except for the issuance of reports.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 31128; Toronto Transit Commission, Equipment Department
INVESTIGATOR: Strasberg, L Tel (416) 248-3771
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can; Toronto Transit Commission, Equipment Department

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Mar. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: $70,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can

03 308324
RING DAMPED RAILWAY WHEELS (PHASE 1, LAB TESTING)
The first phase of this project will determine the efficacy os 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 will involve field testing of the damping rings on a Toronto Transit Commission subway vehicle.
REFERENCES:
Vibration Properties of Two Ring Damped TTC Railway Wheels Strasberg, L; Tiessinga, J, Ontario Ministry of Transportation and Communications, Oct. 1978

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 31129
INVESTIGATOR: Strasberg, L Tel (416) 248-3771
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Aug. 1978 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $75,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, 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 except for report writing, involved the design, manufacture, and lab 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

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 31124
INVESTIGATOR: Strasberg, L Tel (416) 248-3771
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Feb. 1977 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $233,000

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, 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. 1980 TOTAL FUNDS: $5,000,000

ACKNOWLEDGMENT: FRA

04 054561
ON BOARD ENERGY STORAGE FOR TRANSIT CARS
Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on subway cars. The kinetic energy of the moving car during braking is directed to a motor driven flywheel resulting in storage of the energy by increasing the speed of the flywheel. During acceleration the flywheel energy is released and supplies the majority of power required for acceleration of the car. Performance by computer analysis indicates a potential energy savings of 30%. Verification of performance compared to conventional car will be accomplished by operation on the NYCTA subway lines.

Subcontractor is Garrett AiResearch

REFERENCES:

Energy Storage Propulsion System for Rapid Transit Cars: System Design and Equipment Description, Raskin, D; Yutko, R, Available at NTIS, UMTA-NY-06-0006-75-1 46 pp, 1975, PB-249063

Energy Storage Propulsion System for Rapid Transit Cars: Test Results and System Evaluation, Raskin, D, Available at NTIS, UMTA-NY-06-0006-78-1140 pp, 1978, PB-300918

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0006
SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment; Metropolitan Transportation Authority (New York)
RESPONSIBLE INDIVIDUAL: Mora, J Tel (202)426-0090

Contract DOT-UT-550
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1971 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: $1,900,000

ACKNOWLEDGMENT: UMTA

04 058270
ELECTRIFICATION AND ELECTRIC TRACTION
This sub-program is a continuous effort and is concerned with advanced analytical and laboratory studies in electrical propulsion, as well as basic studies for electrification. The work includes power conditioning systems, linear electric motors, power collection, power distribution, and cost analyses.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Raposa, FL Tel 617-494-2031
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

PPA-RR-05
STATUS: Active NOTICE DATE: Aug. 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 are currently being prepared. These specifications which take into account the results of test runs on the systems of DB, FS, PKP and SNCF will enable recommendations for the choice of a system to be drawn up.

Four reports have been published to date. Question A103.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1967

ACKNOWLEDGMENT: UIC

04 179335
ASSESSMENT OF THE PROSPECTS FOR A NEW ENGINE FOR PASSENGER AND FREIGHT RAIL SYSTEMS
Evaluate propulsion for railroads and advise FRA on integration of propulsion R&D with related programs in other government agencies and with industry. Tasks include literature survey of prime movers which have potential for replacing the diesel engine for locomotive propulsion; development of FRA R&D plan for replacement of diesel locomotives with locomotives not requiring petroleum fuel; analysis of plans to study and/or develop prime movers to meet needs of the railroad industry; recommendations for an overall FRA plan in this field.

PERFORMING AGENCY: Spriggs, (JO)
INVESTIGATOR: Spriggs, JO Tel (301) 946-3527
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Kamalian, N Tel (202) 426-9564

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1979

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 operations and reduce costs. The projects selected for the STARS Program were determined after extensive discussions with the major U.S. transit properties. Subsystems in the program include car equipment, including technology application investigations; controls/communications/power, including technology applications investigations; stations/operations, including technology applications investigations; and maintenance technology application investigations.

Contract to a performing agency not yet awarded.

SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

STATUS: Programmed NOTICE DATE: Apr. 1979 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 MLW-LRC LOCOMOTIVE
Purpose is to develop a new Propulsion and Control System for a new, light-weight, high speed passenger locomotive. Prototype equipment will be delivered to MLW Industries for testing in the LRC Locomotive. Estimate 200 Equipments will be required for domestic and export units over the next 10 years.

PERFORMING AGENCY: Canadian General Electric Company, I11H21865
INVESTIGATOR: Woodbury, D
SPONSORING AGENCY: Canadian General Electric Company

STATUS: Active NOTICE DATE: July 1979 START DATE: Jan. 1977 COMPLETION DATE: Sept. 1979

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.

Performing agency to be determined.

PERFORMING AGENCY:
SPONSORING AGENCY: Federal Railroad Administration, Office of Research & Development, Freight Service Division
RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract RFP-DOT-FR-4462
STATUS: Proposed NOTICE DATE: July 1979 START DATE: Nov. 1979 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: $125,000

ACKNOWLEDGMENT: FRA

05 081802
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 6--BRAKE SYSTEM
Task objective is evaluation of the performance of present braking systems to identify those areas where improvements would result from the establishment of performance specifications and/or design guidelines. Evaluation will include stopping distance, reaction time, recharge time, wheel tread temperatures, rigging efficiency, etc. Evaluation will include parametric sensitivity study utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. If desirable, field testing of modified braking systems will be conducted. Task will also include field testing of effects on stopping performance caused by different brake shoes. These tests will be single car "breakaway" tests and will be augmented to full train characteristics using the dynamic simulation computer models.

PERFORMING AGENCY: Association of American Railroads Technical Center
INVESTIGATOR: Misner, GR Tel (312) 567-3587
SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

05 157901
SYSTEMS ENGINEERING FOR BRAKING AND COUPLING SYSTEM DESIGN
This program will evaluate the economic impact and engineering performance of various existing and innovative braking and coupling system concepts which might be candidates for future R&D implementation strategies.

PERFORMING AGENCY: Bolt, Beranek and Newman, Incorporated
INVESTIGATOR: Bender, EK Tel (617) 491-1850
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Tsai, NT Tel (202) 755-1877

Contract DOT-FR-8091
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $250,000

ACKNOWLEDGMENT: FRA

05 159634
DESIGN AND FABRICATION OF A WAYSIDE BRAKE INSPECTION SYSTEM FOR RAILROAD VEHICLES
This contract is for the development of a brake inspection system. It is expected that the system will be able to determine the braking performance of freight cars in a dynamic mode as a train passes through the wayside system. Two techniques are to be integrated into the total system. Infrared measurement of the energy dissipated by the wheels. The second technique will use a short instrumented "reaction rail" section spliced into one rail to give a quantitative indication of the retarding force of the wheels.
A Final Report is in preparation.

PERFORMING AGENCY: Novatek Incorporated
INVESTIGATOR: Spaulding, D Tel (617)272-6230
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Ferguson, JD

Contract DOT-TSC-1323
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Jan. 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: $77,753

ACKNOWLEDGMENT: TSC

05 170652
BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS
Report No. 1 contains the provisional acceptance conditions for brake pads. Studies concerning the physical and chemical properties of pads have been completed and the results are laid down in RP 2. Further tests should demonstrate the suitability of given test procedures for quality checks and also the correlation with the braking performance. Comparative tests on six different test rigs have been completed, studies concerning the causes of differences in the results are in progress and a report No. 4 will be presented in April 1978. Another enquiry concerning the use of composition brake blocks on all ORE administrations has been evaluated and the contents are laid down in RP 3 (initial enquiry B 64/RP 10). On the basis of reports B 64/RP 10 and B 126/RP 1 the final drafts of two UIC leaflets 541-3 and 541-4 have been worked out in co-operation with the UIC Sub-Committee for Braking. Tests in winter conditions (in the dynamic chamber of the Vienna Arsenal Vehicle Testing Station-MBVA) began in September 1977. Results are being analysed, and decisions on future tests will be taken early in 1978. The revised Action Sheet was approved by the Control Committee in October 1977. The B 126 Committee has been asked to prepare a detailed programme and a supplement to the Action Sheet on the problem of brake power limits.
Three reports have been published to date. Question B126.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

05 170656
STANDARDISATION OF THE MATERIAL FOR CAST-IRON BRAKE BLOCKS
Programme of work and the Action Sheet were approved by the Control Committee in October 1977. The selected cast-iron brake shoes are currently being supplied and the laboratory tests will be started in December 1977.
Question B146.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1977

ACKNOWLEDGMENT: UIC

06 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. 1980 START DATE: July 1978 COMPLETION DATE: Mar. 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. 1980 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: $210,000

ACKNOWLEDGMENT: FRA

06 160400
EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY
The status of present-day signal/control equipment and technology both in the United States and abroad will be evaluated. The results will be publicized and recommendations made for further developments and fabrication of a prototype system using the most advanced techniques. One goal of the program is to provide a standardized system for use on passenger routes with emphasis on using the best techniques of present day technology as used throughout the world.
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; Shultz, 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; Shultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.3 356 p.
Task 4: Electrical Noise Disturbance Taylor, SF; Marshall, JF; Shultz, CM; Whalen, RB, STV, Inc., Kentron, Inc., Dyer (TK), Inc.--Available NTIS, FRA/ORD-78/39.4

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. 1980 START DATE: Sept. 1977 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $538,294

ACKNOWLEDGMENT: TRAIS

06 170628
TRANSMISSION OF DATA TO 9.6 KBIT/S
The Committee was set up in October 1976. At the request of the UIC Committee "Data processing", the A 145 Specialists Committee was entrusted with the task of carrying out practical investigations concerning data transmission, particularly on international railway transmission circuits at speeds from 4.8 to 9.6 kbit/s for application on the future international data processing (teleprocessing) network. The tests will only concern those modems that are recommended by the CCITT (V 29). It is suggested that the tests on modems should be made at Vienna-Arsenal and the measurements concerning the bit and block-error rates on the circuits proposed. The following circuits are proposed: Paris, Frankfurt, Vienna, Warsaw, Lucerne, Rome. The first three series of measurements have been made on the above mentioned circuits and the measured values are currently being processed.
Question A145

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976

ACKNOWLEDGMENT: UIC

06 170629
ADAPTATION OF MARSHALLING YARDS FOR TAKING WAGONS WITH WHEEL BASE OF MORE THAN 14 M
Adaptation of electric installations in classification yards for shunting of cars with wheelbase of adjacent axles of more than 14 m. The first stage consists of a technical analysis and an economic survey of existing solutions. The following stage will consist of the choice of solutions(s) for existing yards and/or yards still to be constructed.
Question D147.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170631
PROPAGATION OF RADIO WAVES
The studies are intended to produce guiding principles and data for planning radio links on railway property, covering stations, lines and tunnels. ORE A 133/RP 1 reviewed the documentation available on radio wave propagation and proposed a classification system for railway terrain. Further to this report, methods for the measurement and test of radio propagation on lines, stations and tunnels were produced and applied to collect a considerable amount of experimental data in a number of Administrations. The first series of measurement for the studies were taken in all of the three principal areas of railway terrain. Further measurements are in progress.
One report has been published to date Question A133.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170635
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES
Analysis of possible interference in information transmission installations. Theoretical considerations for different d.c. and a.c. thyristor vehicles and tests. A brief summary of the previous work carried out by the A 122 Committee and of the results obtained have been published in an interim report (A 122/RP 16). It can be said that all important questions relating to tractive vehicles have been cleared up. Basically this also applied to signalling systems. Further studies serve to reveal the disadvantages as regards power collection, determination and definition of interference source characteristics, establishment of sensitivity characteristics of objects subjected to interference, superimposition of multiple source interference and confirmation of methods for calculating induced voltages. Results of investigations into the effects on telecommunication circuits and data transmission due to operating thyristor controlled a.c. tractive units (15 kV 16 2/3 Hz and 25 kV 50 Hz) are given in report A 122/RP 22 of April 1977.
Twenty two reports have been published to date. Question A122.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

06 170650
USE OF ELECTRONIC COMPONENTS IN SIGNALLING
The ultimate object of the studies is to determine the types of electronic component which may be used in railway safety systems, also specifying their applications and the conditions in which they may be applied. The present phase of studies in this field has now been completed. A review of the work of this Committee leads to the following results: 1. Description of the working environment for electronics in railway signaling applications (RP 4 and RP 10). 2. General principles, definitions and methods of calculations applicable to safe electronic systems (RP 1, RP 3, RP 5, RP 6, RP 7). 3. Aids to the design of fail-safe electronic circuits (RP 2, RP 8). 4. Safe electronic systems based on computer technology (RP 9, RP 11, RP 12). Furthermore, a general review of the work of this Committee has been prepared (RP 13) and a problem description concerning the transmission of safety information is being prepared to serve as a basis for future work. It has also been agreed that a colloquium on the subject studied by A 118 will take place in 1980 to report on new developments and recent experience in this field.
Thirteen reports have been published to date. Question A118.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1971

ACKNOWLEDGMENT: UIC

06 193284
IDENTIFICATION AND EVALUATION OF OFF-TRACK TRAIN DETECTION SYSTEMS FOR GRADE CROSSING APPLICATIONS
Study will develop specific conclusions and recommendations on the technical feasibility and cost effectiveness of off-track train detection concepts for activating rail-highway grade crossing warning systems.

PERFORMING AGENCY: GARD Incorporated
INVESTIGATOR: Coleman
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Coleman

Contract DOT-TSC-7430007
STATUS: Active NOTICE DATE: Apr. 1979 START DATE: Sept. 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: $158,000

ACKNOWLEDGMENT: Federal Highway Administration (322118354)

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 COMPLETION DATE: Sept. 1979

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. 1980 START DATE: Nov. 1979 COMPLETION DATE: Mar. 1981 TOTAL FUNDS: $53,099

ACKNOWLEDGMENT: CIGGT

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. 1980

ACKNOWLEDGMENT: FRA

07 148352
PROJECT REAP (RAILROAD EMPLOYEE ASSISTANCE PROJECT)
To develop techniques and program factors that can be used in the development and improvement of alcohol and drug abuse programs. Included in this development will be the verification cost effective measures, and of program effectiveness evaluation techniques. The end goal is to provide information necessary for every railroad to voluntarily develop an alcohol and drug rehabilitation program that will meet its own organizational objectives and needs.
REFERENCES:
Prevalence, Costs, and Handling of Drinking Problems on Seven Railroads, Mannello, TA; Seaman, FJ, Dec. 1979

PERFORMING AGENCY: University Research Corporation
INVESTIGATOR: Mannelo, T Tel (301) 524-3936
SPONSORING AGENCY: Federal Railroad Administration; Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 426-6277

STATUS: Completed NOTICE DATE: Mar. 1980 START DATE: July 1977 COMPLETION DATE: Dec. 1979

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 the Detection, Prevention, and Rehab of the Prob Drinker Employee in the RR Industr, Cornell U, Jan 1976, Proceedings 1975
Employee Assistance--An Alternative to Tragedy, Texas Transportation Institute, November 1976, Proceedings 1976
Local Level Labor-Management Workshop (Carson Inn Project) Chicago, Milwaukee, St Paul & Pacific Railroad, Nov. 1976
Conference on Public Support for Railroad Training Stewart (DA) and Associates, Jan. 1978
Local Level Labor-Management Workshop (Buffalo Terminal Project), Conrail, Aug. 1979

SPONSORING AGENCY: Federal Railroad Administration, Office of Federal Assistance
RESPONSIBLE INDIVIDUAL: Kozak, DJ Tel (202) 426-6277

STATUS: Active NOTICE DATE: Jan. 1980 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 improvements (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. 1980 START DATE: Mar. 1979 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: $400,000

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: Active NOTICE DATE: Feb. 1980 START DATE: May 1979 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: $50,000

ACKNOWLEDGMENT: UMTA

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. 1980

ACKNOWLEDGMENT: FRA

08 153623
MEASURES OF EFFECTIVENESS FOR RAILROAD-HIGHWAY GRADE CROSSING IMPROVEMENTS
The study will establish appropriate methodology for measuring and evaluating effectiveness of safety improvements at grade crossings in terms of available grade crossing inventory, accident, and economic data.

PERFORMING AGENCY: Federal Highway Administration
INVESTIGATOR: Stewart
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Stewart

In-House
STATUS: Active NOTICE DATE: June 1979 START DATE: Sept. 1976 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: $16,000

ACKNOWLEDGMENT: Federal Highway Administration (335036354)

08 159644
COMPUTER SIMULATION OF DERAILMENT IN RAILWAY GRADE CROSSING COLLISION (ENDEV)
Development of a digital computer program to analyze the collision of road and rail vehicles at grade crossings and a sensitivity analysis of the effect on rail vehicle derailment by several variables.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-735
INVESTIGATOR: Cherchas, D
SPONSORING AGENCY: Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: McLaren, B Tel (613) 547-5777

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Apr. 1977 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: $93,666

ACKNOWLEDGMENT: CIGGT

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 178037
GRADE CROSSING SAFETY SURVEILLANCE INFORMATION SYSTEM
Correct grade crossing accident-inventory data base. Analyze accident data to develop severity prediction equations for crossings with gates, stop signs, other active devices, and no warning devices. Validate grade crossing accident severity prediction equations.

PERFORMING AGENCY: Federal Highway Administration
INVESTIGATOR: Stewart
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Stewart

In-House
STATUS: Active NOTICE DATE: June 1979 START DATE: Mar. 1979 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $6,000

ACKNOWLEDGMENT: Federal Highway Administration (291017354)

08 185241
IMPACT OF INCREASED COAL SHIPMENTS IN THE MINNESOTA-NORTH DAKOTA RAIL CORRIDOR
This study of the Burlington Northern mainline from the western border of North Dakota to Minnesota's Twin Cities and to the Minnesota-Wisconsin border near Superior, WI, will focus on low-cost solutions to problems encountered by communities through which frequent unit trains are handling increasing coal traffic. Of particular concern will be grade crossings and problems involving environment, socioeconomic factors and community development.

PERFORMING AGENCY: Department of Energy; Department of Transportation; Burlington Northern, Incorporated
SPONSORING AGENCY: Department of Energy; Department of Transportation; Burlington Northern, Incorporated

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1978 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: $2,500,000

08 193281
CONSTANT WARNING TIME DEVICES FOR USE AT RAILROAD GRADE CROSSINGS
This study concentrates on improving reliability, service life, costs, power requirements, and maintenance for constant time warning time devices which are used at railroad grade crossings. Motorist credibility in constant warning devices is also investigated.

PERFORMING AGENCY: Systems Technology Laboratories
INVESTIGATOR: Allen
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Coleman

Contract DOT-FR-8042
STATUS: Active NOTICE DATE: Mar. 1979 START DATE: Mar. 1978 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $250,000

ACKNOWLEDGMENT: Federal Highway Administration (313028354)

08 193282
RAILROAD PASSIVE SIGN EXPERIMENTAL DESIGN
The purpose is to design an experiment to evaluate accident reduction safety benefits of new active advance warning signs at rail-highway grade crossings. Results will also include a plan for obtaining state cooperation in conducting the experiment.

PERFORMING AGENCY: Wisconsin University, Madison
INVESTIGATOR: Berg
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Coleman

Contract PO 8-40124
STATUS: Active NOTICE DATE: Mar. 1979 START DATE: July 1978 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: $10,000

ACKNOWLEDGMENT: Federal Highway Administration (313018354)

08 194539
GRADE CROSSING ACTIVE ADVANCE WARNING SIGNALS
Study will identify types of grade crossings with active devices where active advance warning signals would improve safety. Prototype active advance warning signals will be developed, tested, and evaluated. Guidelines for use of active advance warning signals will be developed.

PERFORMING AGENCY: JGM Associates
INVESTIGATOR: Ruden
SPONSORING AGENCY: Federal Highway Administration, Traffic Systems Division
RESPONSIBLE INDIVIDUAL: Coleman

Contract DOT-FH-11-9346
STATUS: Active NOTICE DATE: Apr. 1979 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $150,000

ACKNOWLEDGMENT: Federal Highway Administration (290017354)

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 (913) 862-9360

Contract DOT-FR-9026
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Oct. 1978 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $90,000

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, C Tel (202) 293-4206 Bellino, JO Tel (202) 383-2543

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: July 1979 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $4,950

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. 1980 START DATE: Sept. 1973

ACKNOWLEDGMENT: FRA

09 136093
PROTECTION OF WOOD IN USE
OBJECTIVE: Modify existing procedures and develop new ones for imparting a high resistance to wood against biological degradation and harmful weathering action, with special attention to minimizing objectionable environmental side effects. APPROACH: Develop new concepts and procedures for preserving wood such as chemical modification of the polysaccharides in wood. Determine the practicality of diffusion-type treatments for various wood species by studying the effectiveness of various combinations of salts and pretreating steps. Develop improved water-repellent-preservative finishes by increasing the permanence of fungicidal chemicals used in such finishes. Improve the permanence of coatings by modifying the surface of wood as an acceptor of finishes. Assess benefits derived from wood preservatives and from treated wood products.
REFERENCES:
Nonconventional Wood Preservation Methods Rowell, RM, ACS Symposium Series 43(4): 47-56, 1977
Characterization of the Attack on Wood by the Marine Borer Limnoria Tripunctata, Kalnins, MA, Amer. Wood-Preserver's Assoc. Proc. 72: 250-262, 1976
Performance of Single- and Dual-Treated Panels in a Semi-Tropical Harbor, Johnson, BR, Amer. Wood-Preserver's Assoc. Proc., 1977

PERFORMING AGENCY: Wisconsin University, Madison, Forest Products Laboratory
INVESTIGATOR: Feist, WC Tel (608) 257-2211 Gjovik, LR Johnson, BR Rowell, RM
SPONSORING AGENCY: Forest Products Laboratory, 0040038 FPL3212
RESPONSIBLE INDIVIDUAL: Youngs, RL Tel (608) 257-2211

In-House
STATUS: Active NOTICE DATE: Mar. 1979 START DATE: July 1974 COMPLETION DATE: 1978

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GY 40038 2), Forest Products Laboratory

09 138557
IMPROVED INSPECTION, DETECTION AND TESTING RESEARCH
This Division will plan, implement, sponsor and provide overall technical control and direction to development programs in the area of improved inspection, detection and testing techniques and equipment designed to improve railroad safety. The Division is the FRA contact point for all such programs and will provide for interchange of technological information among interested parties within the department, other government agencies and industry. Programs include Safety Life-Cycle Testing, Vehicle Inspection, Track Inspection and Testing, and Automated Inspection System Development.
For the subprograms see RRIS Nos. 03A 138558, 03A 138559, 01A 138560 and 01A 138561.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202)426-1682

STATUS: Active NOTICE DATE: 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 179345
COMPOSITE MATERIALS COMPRISING REACTION-INJECTION-MOLDING COMBINATIONS OF CARBON FIBERS AND THERMOSETTING RESINS
The objective of the research is to establish feasibility of utilizing chemical compositions comprising polyurethanes and polyepoxides, suitable for adaptation to RIM manufacture, in combination with carbon fibers, carbon fiber veil mats, and carbon fiber kevlar mats. It is the further objective of Phase I to define typical physical characteristics of the composites which can be expected to be processable by means of RIM technology. Finally, it is a still further objective of the study of Phase I to define a part suitable in the transportation industry which would serve as a model for the program to be conducted in Phase II of the project. The research consists of a) definition of a rigid polyurethane matrix suitable for use of RIM machines, comprising the selection of a suitable polyether-diphenyl-methane diisocyanate polymer; b) preparation of test composites the above-described fiber products (chopped fibers, mats), and rigid polyurethane or polyepoxide on a laboratory scale with catalyst systems which are known to be operational in RIM equipment; and c) the more promising products resulting from the above machine casting work will be tested. The transportation field, specifically, the automotive vehicle, is receiving considerable attention because of high energy usage. A much lighter-weight vehicle would help solve this and related problems. However, in order to be of use in the automotive industry, these composites must be manufactured by means of

high-speed processes. This research will demonstrate the usefulness of RIM techniques. This research is being supported under the NSF Program Solicitation, "Small Business Innovation Applied to National Needs."

PERFORMING AGENCY: Plastics Technology Associates, Incorporated
INVESTIGATOR: Hostettler, F
SPONSORING AGENCY: National Science Foundation, Division of Intergovernmental Science and Public Technology, ISP-77-19711

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: $24,725

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 417)

09 179346
TECHNOLOGY ASSESSMENT OF ADVANCED COMPOSITE MATERIALS

Advanced composites are relatively expensive high-technology materials that are now used selectively in high-performance applications. Manufacturers of advanced composites are predicting that their costs will decrease significantly over the next few years, so that these materials will be competitive with metals in specific mass market applications. Such continuing cost reductions and an increasing need for high-performance materials in at least two major sectors of the economy, automotive transportation and energy conversion, may result in a period of major growth for the advanced composites industry. If this occurs, a new commodity material industry would emerge with all the concomitant changes and impacts implied. The objective of this work is to develop a framework, through the identification of issues and questions related to the development and use of advanced composite materials, for carrying out a comprehensive assessment of potential long-term socioeconomic and environmental impacts which would result from the increasing uses of these materials in various sectors of the economy.

PERFORMING AGENCY: Argos Associates Incorporated
INVESTIGATOR: Kaiser, R
SPONSORING AGENCY: National Science Foundation, Division of Exploratory Research and Systems Analysis, ERS77-19647

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: $24,969

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 402)

09 179691
CORRUGATED PACKAGE ENGINEERING

Determine ways to utilize wood resources more efficiently through improved engineering, design, and converting of both existing and underutilized fibers. Determine what performance criteria are needed in converting linerboard and corrugating medium to corrugated fiberboard as produced from existing and underutilized fibers; determine the most efficient placement of fiber in the corrugated structure; establish the relationships between the performance of the component paperboards, combined board and finished containers; provide improved and new engineering and design information about the physical requirements of packaging materials for their efficient performance in the service environment. Performance criteria of the component paperboards used in corrugated fiberboard were studied in terms of compressive resistance of the finished structure. The results were published in Tappi 61(8):69-71, August 1978, entitled "Compressive Properties of Linerboard as Related to corrugated Fiberboard Containers: Theoretical Model Verification;" and indicated that when using paperboard with Certain stress-strain properties, it is more efficient to add lower cost fiber to the fluted core than to increase the weight of the facings. The development of a new method of analysis of duration of load data was reported in Tappi 60(12):128-131, December 1977, entitled "Long-Term Creep in Corrugated Fiberboard Containers." This research suggests a new method for nondestructive evaluation of containers. Current Research is being conducted in the area of thermal properties of corrugated containers, the use of hardwood fibers in linerboard, the optimum distribution of fiberboard in singlewall corrugated fiberboard, the vibration response of columns of containers, the use of hardwood hardboard as unitizing platforms, and the development of a performance test for more accurately evaluating corrugated fiberboard containers.

PERFORMING AGENCY: Forest Products Laboratory
INVESTIGATOR: Koning, JW, Jr
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Feb. 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 the two Canadian rail manufacturers. By 1981 a comprehensive monograph defining the metallurgical properties, weldability and optimum cooling rates of several rail compositions will be published as the culmination of a program thrust to achieve technology development and transfer. A continuing technical monitoring after 1981 is envisaged. It is anticipated that the quality of Canadian rail will continue to improve aided by this CANMET initiative and that the domestic market for premium rail for unit train service in mountainous regions will be satisfied by domestic producers. An improved Canadian premium rail capability will also enhance off-shore marketing possibilities.

PERFORMING AGENCY: Department of Energy, Mines and Resources, Canada, F41A32001
INVESTIGATOR: Brigham, R
SPONSORING AGENCY: Department of Energy, Mines and Resources, Canada

STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

10 058621
RAILROAD RETARDER NOISE REDUCTION
A cooperative effort is planned between DOT (TSC), and the BN to collect, assess and disseminate information regarding the character of the noise environment associated with the operation of active retarders in railroad classification (hump) yards and also, to present in useful form information on how to reduce retarder noise locally and to surrounding communities by the use of noise barriers. Information will be obtained by a measurement, barrier construction and evaluation program to be conducted at the Northtown freight classification yard of the Burlington Northern Railroad, Fridley, Minnesota.
REFERENCES:
Railroad Retarder Noise Reduction Study of Acoustical Barrier Configuration, Final Rpt. DOT-TSC-NHTSA-79-35

PERFORMING AGENCY: Burlington Northern, Incorporated
SPONSORING AGENCY: Transportation Systems Center, OS-507
RESPONSIBLE INDIVIDUAL: Rickley, EJ Tel (617)494-2372

Contract DOT-TSC-1035 (CPFF)
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: May 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: $69,150

ACKNOWLEDGMENT: TRAIS (OS-507), FRA

10 058675
DEVELOPMENT OF ENGINEERING DATA ON IN-SERVICE PERFORMANCE AND COSTS OF METHODS FOR CONTROL OF URBAN RAIL SYSTEM NOISE
The objective is (1) to develop definitive engineering data on long term costs and performance of four noise control techniques, and (2) to organize and present the data to permit engineering estimates of costs and performance of the techniques on any urban rail transit system in the United States. The techniques are: (a) use of resilient wheels on transit cars, (b) use of damped wheels, (c) use of wheel truing equipment to remove wheel flats and reduce wheel roughness, and (d) use of rail grinding equipment to reduce rail roughness.
REFERENCES:
In-Service Performance and Costs of Methods for Control of Urban Rail System Noise. Experimental Design, Holowaty, M; Saurenman, H; Rosen, S, UMTA-MA-06-0025-76-4Intrm Rpt., May 1976
In-Service Performance and Costs of Methods to Control Urban Rail System Noise. Test and Eval Plan, Saurenman, H; Holowaty, M, UMTA-MA-06-0025-7710Intrm Rpt., Apr. 1977
In-Service Performance and Costs of Methods to Control Urban Rail System Noise. Initial Test Series Report, Shipley, RL; Saurenman, H, UMTA-MA-06-0025-78-7, Aug. 1978

PERFORMING AGENCY: De Leuw, Cather and Company
SPONSORING AGENCY: Transportation Systems Center, UM-949
RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: June 1975 COMPLETION DATE: Nov. 1979 TOTAL FUNDS: $480,000

ACKNOWLEDGMENT: TRAIS (UM-949), TSC

10 138534
NOISE ABATEMENT
Identified as a major systems problem for transit authorities, this program has as its objective the reduction of noise and vibration on urban rail transit systems. Problem areas have been identified and the noise climate on operating authorities has been appraised. Tests and evaluation of available abatement hardware are to be made. New technology is to be developed. A handbook on noise and vibration control is to be produced.

PERFORMING AGENCY: Transportation Systems Center
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract DOT-UM-604
STATUS: Active NOTICE DATE: July 1976 START DATE: 1971 COMPLETION DATE: June 1979 TOTAL FUNDS: $3,500,000

ACKNOWLEDGMENT: UMTA

10 148341
WHEEL/RAIL INTERACTION SIMULATOR
Design of a machine which simulates interaction of rails and wheels for purposes of noise measurements.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can
INVESTIGATOR: Curmi, RA Tel (416)248-3771
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can
RESPONSIBLE INDIVIDUAL: Curmi, RA Tel (416)248-3771

STATUS: Inactive NOTICE DATE: Feb. 1980 START DATE: Dec. 1976

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communic, Can, Roads and Transportation Association of Canada

10 170655
RAILWAY NOISE
The reference values for the noise and vibration stresses to which people are exposed is established along with the progragation of train running noise and the influence of sound protection barriers and vehicle skirting. Proposals for noise abatement measures for older railway vehicles and the effect of time on the acoustic behaviour of railway vehicles are presented. Noise generation during the wheel/rail rolling contact and when braking and negotiation sharp curves are discussed. A report about noise levels inside and outside the vehicles of various Administrations was approved in the meantime. It takes into account statutory regulations and gives provisional guide values for noise levels. A further report explains radiation and propagation conditions for railway noise in free field on embankments and in cuttings. A detailed work program is being drawn up for dealing with sound variation from bridges. Furthermore, the influence of sound protection barriers and vehicle skirting has been studied. Curve screech and braking noise tests are terminated. The findings have been summarized in a report. An interim report is now available concerning experience with technical noise abatement measures for old vehicles.
Seven reports have been published to date. Question C137.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

10 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

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: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1976 COMPLETION DATE: May 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: Active NOTICE DATE: Feb. 1980 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: Active NOTICE DATE: Feb. 1980 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.

PERFORMING AGENCY: Bolt, Beranek and Newman, Incorporated, UM-06-0025
INVESTIGATOR: Ungar, E Tel (617) 491-1850
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Kendig, R Tel (617) 494-2394

Contract DOT-TSC-1531
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: $322,000

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.

PERFORMING AGENCY: Parsons, Brinckerhoff, Quade and Douglas, Inc
INVESTIGATOR: Kennedy, WD
SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Mar. 1980

10 193280
MEASUREMENT AND PREDICTION OF NOISE FROM NEARBY AIR AND RAIL OPERATIONS FOR HIGHWAY PROJECTS
Prepare manual for evaluating and predicting community noise levels resulting from air, rail and highway operations.

PERFORMING AGENCY: Transportation Systems International
INVESTIGATOR: Woo
SPONSORING AGENCY: Federal Highway Administration, Implementation Division, 400 7th Street, SW
RESPONSIBLE INDIVIDUAL: Bova

Contract DOT-FH-11-9533
STATUS: Active NOTICE DATE: Mar. 1979 START DATE: Sept. 1978 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: $29,000

ACKNOWLEDGMENT: Federal Highway Administration (349108356)

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: July 1979 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 CONVENTIONAL AND SPARK ASSISTED DIESEL ENGINES
This is a new research effort for the Research Applied to National Needs (RANN) program. A comprehensive study directly related to the problem of odor formation and control, will be conducted. The primary objectives are: (1) to understand the physical and chemical phenomena responsible for the formation of odoriferous compounds in conventional and spark assisted diesel engines; and (2) to test in the laboratory feasible methods for minimizing odor emissions while maintaining acceptable NOx and smoke emissions. The program will include bench scale experiments and supportive analytical studies in addition to single cylinder engine studies. The bench scale burner studies measure odor production in heterogeneous combustion systems. The effects of swirl, turbulence level, nozzle design, fuel type, mass transfer rates, lean flammability limit, etc., on odorant production will be examined under well controlled conditions. These results will be used to isolate the important chemical and physical factors responsible for odor production. Some combustion simulation and analytical modeling will be carried out in parallel with the experimental program.

PERFORMING AGENCY: Drexel University, School of Engineering, Dept of Mechanical Eng & Mechanics
INVESTIGATOR: Matula, RA Cernansky, NP
SPONSORING AGENCY: National Science Foundation, Division of Advanced Energy & Resources Res & Technology, AER76-19752

STATUS: Active NOTICE DATE: Dec. 1979 START DATE: June 1976 COMPLETION DATE: Mar. 1981

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 285 2)

11 058375
MORGANTOWN PERSONAL RAPID TRANSIT SYSTEM IMPACT EVALUATION PHASE I
This study consists of four phases as follows: (1) Pre-PRT phase prior to passenger service of the system, (2) Interim Phase during initial passenger service, (3) Operational Phase following introduction of revenue service, and (4) Final Phase integrating all data about Phase I system. The study objectives include (a) to measure the service and accessibility of the system, (b) to determine the nature of system patronage, (c) to describe the operational costs and revenues of the system, (d) to examine the attitudes toward the systems, (e) to measure the impact of the PRT on travel and traffic, the economy, the society, and the environment in the PRT corridor. The Pre-PRT and Interim Phases have been completed. The Operational Phase is scheduled for completion in February 1979. The Final Report Phase is scheduled for completion in March 1979.

PRT Impact Study, Pre-PRT Phase. March 1976, Volume 1- Travel Analysis, SEG Elias; Volume 2-Data Collection Methodology and Coding Manual; Volume 3-Frequency Tabulations from Transportation Related Surveys, CN Redwine. Interim Phase. June 1977, Impact Evaluation of Morgantown PRT 1975-1976 Ridership: Interim Analysis, M.D. Stearns and K.H. Schaeffer.

PERFORMING AGENCY: West Virginia University, WV-03-0006 DOT-TSC-1316
INVESTIGATOR: Elias, SEG Tel (304) 293-5536
SPONSORING AGENCY: Transportation Systems Center, UM-839; Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Stearns, MD Tel (617)494-2796 Rubin, D Tel (617) 494-2160

Contract DOT-TSC-985
STATUS: Inactive NOTICE DATE: Jan. 1979 START DATE: Jan. 1975 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: $272,333

ACKNOWLEDGMENT: UMTA, West Virginia University, TSC

11 059435
ALTERNATIVE GUIDEWAY CROSS SECTION STUDY
The successful implementation of advanced technology transportation systems-systems more advanced than those currently being investigated in UMTA's Automated Guideway Transit (AGT) program-may well depend on the ability of system designers to develop low cost, elevated, aesthetically pleasing guideways permitting extensive switching and carrying two-way vehicle flow. Possible guideway configurations which meet these criteria include those with an elevated single beam span which can support two-way flow by either suspending the vehicles from the side of the beam or in an over-and-under configuration. What is needed is a rational approach to measure the overall effectiveness of the various guideway possibilities, particularly with regard to structural efficiency and cost.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Wormley, DN
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-9364

ID DOT-AS-70005
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 TOTAL FUNDS: $20,000

ACKNOWLEDGMENT: TRAIS

11 135604
COMMAND AND CONTROL SYSTEMS FOR ADVANCED TRANSPORTATION SYSTEMS
This project is a study of new "people mover" concepts which may evolve to provide practical attractive alternatives to the private automobile as a mode of transportation. Each concept requires a command and control system not only to provide safety but also to ensure efficient and expeditious movement of traffic. In all cases operation is automatic with respect both to the onboard control of the propulsion and brakes of the individual vehicles and also to the overall coordination of system functions. Development effort has been directed toward meeting new requirements of advanced system concepts. Especially in the area of Personal Rapid Transit, controls are being developed to meet the conflicting need to achieve traditional standards of rapid transit safety while permitting the short headways necessary for acceptable capacity with small vehicles. A family of control systems is being realized for applications varying widely with respect to vehicle characteristics, guideway configuration, and operating policy (scheduled or demand modes of service).

PERFORMING AGENCY: General Railway Signal Company
INVESTIGATOR: Auer, JH
SPONSORING AGENCY: General Railway Signal Company

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (AQ 881 2)

11 138792
MORGANTOWN PEOPLE MOVER (MPM) SYSTEM
Develop a people mover system capable of carrying 5,000 passengers per lane per hour at a headway of 15 seconds. Prove the technical and operational feasibility of fully-automated "people mover" systems. Identify the economic and service benefits of the Morgantown people mover system and assess the institutional problems encountered in building such a system in an urban environment. The concept of automatic control for a vehicle system operating on close headways and the fail-safe concept using checked redundance have been validated by the excellent safety and operational record of the system. The system has recently completed expansion (Phase II) under an UMTA Capital Grant of $63.6M to the West Virginia Board of Regents. The system now comprises 5 passenger stations, 8.6 miles of single lane guideway, 73 vehicles, and facilities for central control and maintenance. During the expansion another maintenance facility and a heated power rail were added, and other technical improvements were made to vehicles, electronics, and computers. The expanded system opened for public use on July 2, 1979, and began revenue service on September 9, 1979. The system is expected to carry 4-6 million passengers in its first year of revenue operation.

Additional contractor is the Trumbull Corporation.
REFERENCES:
Morgantown People Mover System-Phase I Report Boeing Aerospace Company, Nov. 1975
Morgantown People Mover, Phase I Impact Evaluation Hsiung; Stearns, U.S. Department of Transportation, Oct. 1979
MPM Operation and Maintenance History (1st Year) Stone, A, Boeing Aerospace Company, Jan. 1977
MPM Operation and Maintenance History (2nd & 3rd Years) Watt, CW, U.S. Department of Transportation, Oct. 1979
Morgantown People Mover Impact Evaluation: Interim Analysis of Ridership, Stearns; Schaeffer, U.S. Department of Transportation, Mar. 1977

PERFORMING AGENCY: Boeing Aerospace Company; Harris (Frederic R), Incorporated; Daniel, Mann, Johnson and Mendenhall
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Barsony, SA Tel (202) 426-2896

Contract WV-06-0005
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1970 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $130,000

ACKNOWLEDGMENT: UMTA

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/RSPA/DPB-50/79-34, Sept. 1979

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, T Tel (617) 494-2758

Contract DOT-OS-60135

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1976 COMPLETION DATE: June 1980 TOTAL FUNDS: $226,000

ACKNOWLEDGMENT: DOT

11 149463
SYNCHRONOUSLY OPERATING LINEAR ELECTRIC MOTORS FOR GROUND TRANSPORTATION
To conduct studies, primarily analytical, of certain aspects of linear synchronous motor operation and design. To review work of General Electric, done under a related contract, on the design of linear synchronous motors, and on the construction and testing of a small scale model of such machines.
REFERENCES:
Preliminary Method for Design of a Linear Synchronous Motor, Inductor Type, Levi, E, Jan. 1977

PERFORMING AGENCY: Polytechnic Institute of New York, Department of Transp Planning & Engineering, 333 Jay Street, PR-4227
INVESTIGATOR: Levi, E Tel (212)643-4486 Birenbaum, L Zabar, Z
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202)426-9665

Contract DOT-FR-64227
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: Sept. 1975 COMPLETION DATE: 1979 TOTAL FUNDS: $62,660

11 156700
DYNAMIC EXPERIMENTS OF ALTERNATIVE GUIDEWAY-VEHICLE SYSTEMS
The broad purpose is to experimentally investigate vehicle- elevated guideway response dynamics. Non-dimensional system responses such as critical bending moments on multiple-span bridges and associated heave accelerations of passing, sprung-mass vehicles are correlated with computer-aided predictions. Similar results are being obtained for cable- stayed bridges and curved spans.
REFERENCES:
Experiments in Guideway-Levitation Vehicle Interaction Dynamics, Wilson, JF, NTIS, FRA-OR&D 76-259, July 1976
Experiments in Guideway-Levitation Vehicle Interaction Dynamics, Wilson, JF, NTIS, July 1976, PB-257941
Transient Dynamics of Curved Guideway Structures: Frequency Spectra, Wilson, JF; Garg, DP, AIAA/ASME 18th Structures Conference, Paper 77-371, Mar. 1977
Transient Dynamics of Curved Guideway Structures for Urban Vehicles Dynamic Responses, Wilson, JF, Proc 8th Annual Conf on Modeling and Simulation, Apr. 1977
Orthotropic Plate Responses to Convective Loads Wilson, JF, Developments in Theoretical and Applied Mechanics, Volume 9, 1978
Dynamics of Curved Guideway Spans for AGT Vehicles Wilson, JF; Joseph, TP, Proc Conf Automated Guideway Transit Tech Devel; US DOT, Mar. 1978
Frequencies of Annular Plate and Curved Beam Elements Wilson, JF; Garg, DP, AIAA Journal, Mar. 1978
Dynamic Experiments of Alternative Guideway-Vehicle Systems, Part I, Wilson, JF, DOT/RSPA/DPB-50/7711, June 1978

PERFORMING AGENCY: Duke University, 343-9934
INVESTIGATOR: Wilson, JF Tel (919) 684-2434 Garg, DP
SPONSORING AGENCY: Department of Transportation, Office of University Research, Res & Special Program Admin
RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-60130
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: June 1976 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: $116,361

ACKNOWLEDGMENT: Duke University

11 159658
AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, SYSTEM SAFETY AND PASSENGER SECURITY PROJECT
The objectives of the project are to develop automated guideway transit guidelines for: (1) passenger security, (2) evacuation and rescue, (3) passenger safety and convenience services,(4) develop a model of the passengers values and needs with regard to personal security, (5) determine safe emergency deceleration and jerk maxima and passenger seat retention characteristics, and (6) evaluate and disseminate guidebook information through safety and security workshops.
As part of this effort a study on the effects of a closed-circuit television system on passenger security perception is being conducted in cooperation with the New York City Transit Authority. Subcontractors are University of Virginia and the Vought Corporation

PERFORMING AGENCY: Dunlap and Associates, Incorporated
INVESTIGATOR: Pepler, RD Tel (202)655-3971
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Sussman, ED Tel (617)494-2041

Contract DOT-TSC-1314
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Jan. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $588,000

ACKNOWLEDGMENT: UMTA

11 159659
AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LATERAL CONTROL AND SWITCHING (VLACS) PROJECT
The VLACS project will develop AGT vehicle lateral control and switching concepts that (1) reduce cost, weight, and complexity, (2) improve performance (ride quality), life, reliability, and increase switching capability. The VLACS project provides for an experimental program to validate and evaluate the analytical design studies. Both contact (mechanical) and non-contact (wire follower) lateral control systems will be evaluated. To aid government officials, transit planners and system manufacturers, the VLACS project will develop lateral control and switching system guideline specifications and data base of the current technology.

PERFORMING AGENCY: Otis Elevator Company, Transportation Technology Division
INVESTIGATOR: Haines, GA Tel (303) 343-8780
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

Contract DOT-UT-70088
STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $869,477

ACKNOWLEDGMENT: UMTA

11 159660
AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LONGITUDINAL CONTROL AND RELIABILITY
Reduce cost and complexity and increase reliability of Longitudinal Control Systems through the following steps: (1) Technology Evaluation and Model Development; (2) Vehicle Longitudinal Control Studies; (3) Reliability Enhancement Studies; (4) Entrainment and Platooning Studies; (5) Experimental Program; (6) Data Base Development and Guidelines Specification and Requirements.

PERFORMING AGENCY: Otis Elevator Company, Transportation Technology Division
INVESTIGATOR: Schumacher, P Tel (303)343-8780
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Contract DOT-UT-70048
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $2,562,000

ACKNOWLEDGMENT: UMTA

11 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 160276
AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, GUIDEWAY AND STATION TECHNOLOGY PROJECT
Develop guideway, station and weather protection concepts which will reduce the cost of AGT systems. The work includes: state-of-the-art reviews of existing AGT guideways and stations found at AGT and AGT related systems and weather protection provisions and techniques; the development of design guidelines for AGT guideways and stations including site integration; the development of evaluation models, including cost and implementation time, for AGT guideways and stations; and the development of a dynamic model calibrated by using ride quality data from selected AGT systems.
REFERENCES:
AGT Guideway and Station Technology, Volume 2, Weather Protection Review, Stevens, RD; Nicarico, TJ; McGean, TJ, UMTA-IT-06-0152-79-1Avail NTIS, Mar. 1978
AGT Guideway and Station Technology, Volume 3, Guideway and Station Review, Stevens, RD; Dolan, CW; Pour, RJ; Nettles, TA, UMTA-IT-06-0152-79-2Avail NTIS, Sept. 1978

PERFORMING AGENCY: De Leuw, Cather and Company, P2914
INVESTIGATOR: Stevens, RD Tel (312) 346-0424
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4047

Contract DOT-UT-70066 (CPFF)
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $999,685

ACKNOWLEDGMENT: TRAIS

11 170589
ACCELERATING WALKWAY DEMONSTRATION
A moving walkway which accelerates a user from a 1.5 mph entrance speed to a 7.5 mph cruise speed and then decelerates the user back to a 1.5 mph exit speed is being developed, tested and demonstrated. The system provides an up to five times improvement in cruise speed compared to conventional constant speed moving walkways.

PERFORMING AGENCY: Port Authority of New York and New Jersey, IT-06-0126
INVESTIGATOR: Fruin, J Tel (201) 963-7205
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: Dec. 1982

ACKNOWLEDGMENT: UMTA

11 170593
ECONOMIC FEASIBILITY OF A MAGNETICALLY LEVITATED TRANSPORTATION SYSTEM IN THE CANADIAN CORRIDOR
The economic feasibility of a magnetically-levitated high-speed (350 km/h and (450 km/h) passenger system in the Canadian Corridor is being evaluated in terms of its relative viability vis a vis very-high-speed conventional rail (300 km/h) and intermediate-speed conventional rail (200 km/h) alternatives. Project objectives include design optimization, the investigation of possible implementation scenarios and development time frames, and an assessment of economic and/or commercial viability.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-848
INVESTIGATOR: Lake, RW Tel (613) 547-5777 Boon, CJ Eastham, AR
SPONSORING AGENCY: Transport Canada Research and Development Centre
RESPONSIBLE INDIVIDUAL: Audette, M Tel (514) 283-2880

Contract OST-77-00109

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Dec. 1977 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: $214,000

ACKNOWLEDGMENT: CIGGT

11 170605
AGTT/AGRT SUPPORT AND CONSENSUS
APTA will provide UMTA's AGRT and AGTT programs with transit industry input, advice, and consensus on automated guideway transit technology and advanced group rapid transit in such areas as classification, basic requirements, service and operational requirements, passenger accommodations, system and subsystem design requirements, and system verification, certification, and acceptance.

PERFORMING AGENCY: American Public Transit Association
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-70058
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Feb. 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: $99,738

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
SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Apr. 1979 START DATE: Mar. 1979 COMPLETION DATE: Sept. 1980

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.

See also RRIS 11 148334.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-902

INVESTIGATOR: Eastham, AR Tel (613) 547-3237 Dawson, GE Atherton, DL Schwalm, CL

SPONSORING AGENCY: Mitre Corporation

RESPONSIBLE INDIVIDUAL: Katz, RM Tel (703) 827-6685

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: June 1979 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $53,000

ACKNOWLEDGMENT: CIGGT

11 196739
AN ASSESSMENT OF THE DYNAMIC BRAKING PERFORMANCE OF A SLIM WITH A SQUIRREL-CAGE REACTION RAIL

An experimental program to evaluate the dynamic braking performance of a SLIM with a squirrel-cage reaction rail is underway. The laminated squirrel-cage rail is mounted on the rim of a 7.7m diameter 0-101 km/h test wheel. A 1.73m long 6-pole linear induction motor primary is mounted in a 6-component force balance and energized by a 200 kva PWM inverter. Tests are being conducted throughout the plugging, motoring and dynamic braking regions and data (3 phase voltages, currents & powers, frequency, speed, gap, forces, moments & flux distribution) are sampled, processed and stored in SI units by a 64-channel minicomputer acquisition system.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-920

INVESTIGATOR: Eastham, AR Tel (613) 547-3237 Dawson, GE Schwalm, CL

SPONSORING AGENCY: Canadair Services Limited

RESPONSIBLE INDIVIDUAL: Williamson, BF Tel (613) 389-9023 Wallace, A

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: May 1979 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: $13,000

ACKNOWLEDGMENT: CIGGT

12 058838
SYSTEM SAFETY-AN INTERDISCIPLINARY APPROACH TO TRANSPORTATION SAFETY
The effort concerns the applicability of system safety concepts at the planning and design stages of new transportation facilities, equipment or programs and in the operational stages of existing facilities or ongoing programs. Specific results shall be generated in methodology and guidelines and in case studies. The specific objectives of the safety research are: 1. To transfer applicable systems concepts to the transportation safety sector. 2. To identify and resolve key issues in transportation safety. 3. To develop a transportation systems safety methodology applicable to the transportation industry-A symposium co-sponsored by TRB on the applicability major and used of system safety in transportation will be organized in May 1979.
REFERENCES:
Transportation Systems Safety. A Literature Search and Annotated Bibliography, Cantilli, EJ et al, Mar. 1976
Key Issues in Transportation Safety Horodniceanu, M et al, June 1976
Transportation System Safety Methodology Cantilli, EJ et al, Jan. 1977
Safety Issues in Transportation Horodniceanu, M et al, Feb. 1978
TSM: Applicability to the Highway Mode Horodniceanu, M et al, Feb. 1978
A Behavioral Consideration of the Pilot-Air Traffic Controller Interface, Salzinger, K et al, Final Report, Jan. 1978
TSM: Applicability to the Rail-Rapid-Transit Mode Cantilli, EJ et al, Final Report, May 1978

PERFORMING AGENCY: Polytechnic Institute of New York, Transportation Training and Research Center
INVESTIGATOR: Pignataro, LJ Tel (212) 643-5272 Cantilli, EJ
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: McGuire, CW Tel 202-4264458

Contract DOT-OS-50241
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1975 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $469,157

ACKNOWLEDGMENT: TRAIS (PUR-50315), OST, Polytechnic Institute of New York

12 059864
EVALUATION OF SAFETY OF LOADING AND SECUREMENT HARDWARE FOR TRANSPORTING WHEELCHAIR PASSENGERS ON TRANSIT VEHICLES
The objectives includes: (1) developing safety guidelines for wheelchair loading equipment, (2) determining the crashworthiness of standard wheelchairs secured by selected, representative securement systems, (3) comparison of parameters other than safety of systems being tested (i.e., ease of use, acceptability to user, costs), (4) recommendation of design modifications if they are found to be needed, (5) establishment of the cost effectiveness of the securement systems, and (6) development of educational materials for users and operators of wheelchair loading and securement facilities.

PERFORMING AGENCY: California Department of Transportation
INVESTIGATOR: 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. 1980 START DATE: Jan. 1977 COMPLETION DATE: July 1980 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 312-5673607
SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Active NOTICE DATE: Feb. 1980 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. 1980

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. 1980 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099428
RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 6-SAFETY VALVE DISCHARGE CAPACITY

When a tank car carrying liquified compressed gas is heated in a fire, its contents can expand to where the tank can become nearly shellfull at the safety valve pressure setting. The safety valve must then maintain safe tank pressure by momentarily discharging liquid. It may also be called upon to do this through liquid discharge in the event the tank is overturned and exposed to fire. As in other pressure vessel codes, the tank car specifications require that safety valves be sized and tested on the basis of vapor discharge. There being no firm data on liquid discharge capacities, this Phase was established with the objective of determining such capacities by means of full-scale test. Toward this end, a special 20,000 gallon test tank was fabricated with provisions for mounting the currently used safety valves on both the top and bottom of the tank. The tank has been installed at Edwards Air Force Base, and tests have been run using water, air, and vapor and liquid LPG. This program is being conducted on a cooperative basis with the FRA. Results, not yet available, will be published after all data is reduced.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration
SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1980 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 six year period 1971-1976 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. 1980 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 130946
QUANTITATIVE DESCRIPTIONS OF TRANSPORTATION ACCIDENTS INVOLVING HAZARDOUS MATERIALS

Description: Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of the five major environments (impact, fire, puncture, crush and immersion) experienced by casks or containers in air, highway and rail transportation. Analyses of these predicted environments to assess possible revisions or regulatory standards. Consideration of specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident, to determine threat probabilities for potentially large contamination incidents. Revision of analytical descriptions to make the results more applicable to an increasing number of specific risk analysis studies aimed at optimizing procedures for transporting radioactive materials. Compilation of pertinent accident information in a data bank to provide retrievability of specific information to parties performing analyses.

This project is also supported by Sandia Laboratories.

PERFORMING AGENCY: Sandia Laboratories, 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: Aug. 1979 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GPW 51 1)

12 135594
PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS

Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of five major transportation accident environmental categories (impact, fire, puncture, crush and immersion) that may be experienced by casks or containers in air, highway, rail, and water transportation. Analyses of these environmental categories can be used in the consideration of possible revisions of the regulatory standards. Consider the specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident to determine the threat probabilities for potentially large contamination incidents. The analytical description available in these studies are applicable to specific risk analysis studies aimed at optimizing procedures for transporting hazardous materials. Compilation of pertinent accident information in a data bank provides retrievability of specific information to parties performing transportation accident analyses.

PERFORMING AGENCY: Sandia Laboratories, Nuclear Materials Transportation Technology Dept 4550, ALO 117B
INVESTIGATOR: McClure, JD Tel (505) 264-8753 Foley, JT Davidson, CA
SPONSORING AGENCY: Department of Energy, ETW, Transportation Branch
RESPONSIBLE INDIVIDUAL: Chitwood, PB Tel (202) 353-4077

Contract DE-AC04-76DP00789
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: 1975

ACKNOWLEDGMENT: Department of Energy

12 135596
MAINTENANCE OF A TRANSPORTATION ACCIDENT ENVIRONMENTAL DATA BANK

The maintenance of this data bank involves the active pursuit of sources of new data, the updating of indices, and responding to official users who wish to obtain environmental data. A necessary part of this continued work is the processing of data and entry into the storage and retrieval system. As needs for new data are identified, these will be sought. User requests for nonexisting data are expected to be a major contributor to this identification.

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: Foley, JT Tel (505) 264-3036 Davidson, CA
SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division
RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361 Priddy, TG Tel (505) 264-6764

Contract AL 051
STATUS: Active NOTICE DATE: Oct. 1978 START DATE: July 1975 TOTAL FUNDS: $330,000

ACKNOWLEDGMENT: Department of Energy

12 135599
FULL SCALE VEHICLE TESTING PROGRAM
This project plans full scale accident tests to determine the integrity of shipping casks for transportation of nuclear wastes. The problem of transporting nuclear wastes becomes more acute as operating reactors increase. Demonstrations of shipping container integrity are necessary. Three extreme accident full scale tests using obsolete casks are planned: (1) High speed locomotive impact on stalled truck cask; (2) High speed derailment of rail cask into solid abutment followed by fire; (3) Truck mounted cask at high speed into solid barrier. Modeling and analysis will precede instrumented tests. Results will aid in prediction of performance of currently used, better designed casks.

PERFORMING AGENCY: Sandia Laboratories, AL 3617A
INVESTIGATOR: Yoshimura, HR Tel (505) 264-2452
SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division
RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract E(29-1)-789
STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1975 TOTAL FUNDS: $1,170,000

ACKNOWLEDGMENT: Department of Energy

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. 1980 START DATE: June 1976

ACKNOWLEDGMENT: FRA

12 148324
THE DEVELOPMENT OF A SYSTEMS RISK METHODOLOGY FOR SINGLE AND MULTI-MODAL TRANSPORTATION SYSTEMS
The purpose of the research is to develop and verify a probabilistic systems methodology for the quantitative risk assessment of existing or future transportation systems. The objective of the first phase of the research was to develop primary risk models for estimating the probability of failure of each major component in air transportation, rail transportation and highway transportation.
REFERENCES:
Development of a Risk Methodology for Transportation Systems Safety, Transportation Systems Safety Research Group, Technical Report, Feb. 1976
Development of a Risk Methodology for Transportation System Safety, Final Report, Oct. 1976

PERFORMING AGENCY: Illinois University, Urbana, Department of Mechanical & Industrial Engineering
INVESTIGATOR: White, RA Tel (217) 333-0356
SPONSORING AGENCY: Department of Transportation, Office of University Research, Res & Special Program Admin; Illinois University, Urbana
RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190
Contract DOT-OS-50238
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1975 TOTAL FUNDS: $159,000

ACKNOWLEDGMENT: DOT

12 148348
TRANSPORTATION SAFETY INFORMATION SYSTEM (TRANSIS)
The objective of this system is to make data and information on safety performance and on on-going safety activities in all transportation modes readily available to DOT managers to allow intermodal comparisions. 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

12 170651
AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS
Study of problems linked with the perception of acoustic warning signals (noise produced by track working machines) and determination of optimum acoustic and visual signals for the warning, of maintenance gangs working on the track, of the approach of trains. Study of systems for the automatic initiation and transmission of the announcing of trains approaching the track working site. The study of the noise produced by track working machines has formed the subject of a draft UIC leaflet, examined by the competent Sub-Commissions of the UIC in 1974. The studies and tests should, in a few months, permit the best acoustic signals for the warning of gangs working on the track to be defined. Tests on automatic radio transmission announcing systems are shortly going to be undertaken.
Eight reports have been published to date. Question A124.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

12 170780
SAFETY AND SYSTEM ASSURANCE
Continue development of safety plans for rail transit, and initiate safety plans for light rail and bus transit systems. Continue requirements and priorities of rail and bus systems on safety matters. Develop means to communicate safety information among transit systems and federal government.

PERFORMING AGENCY: American Public Transit Association
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60061
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Dec. 1976 COMPLETION DATE: Nov. 1979 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. 1979
ACKNOWLEDGMENT: FRA

12 188664
DEVELOPMENT OF A TRAINING PACKAGE FOR HANDLING TRANSPORTATION EMERGENCIES INVOLVING RADIOACTIVE MATERIALS
This training package is designed to improve the knowledge, performance and confidence of emergency response personnel in the characteristics of radiation and the measure which must be taken for their own protection and the protection of the public pending arrival or guidance of radiological experts. This training, although not highly technical, will be practical so that students will grasp the fundamentals of radiation safety and retain sufficient information to assist them in providing the proper response. The training program will include practical class training periods and suitable reference material for later self study and review. This training package will extend the knowledge and performance methodology of personnel who have taken the training course "Handling Hazardous Materials Transportation Emergencies." The length of this course is estimated to be eight classroom hours, and include a set of 35 mm slides, pulsed synchronized audio tapes, interactive Student Workbooks, an Administrator's Guide, and student evaluation Questionnaire.

PERFORMING AGENCY: Canyon Research Group, Incorporated, 3058
SPONSORING AGENCY: Office of the Secretary of Transportation
RESPONSIBLE INDIVIDUAL: Carricker, W

Contract DOT-RC-82040
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $64,912

ACKNOWLEDGMENT: Canyon Research Group, Incorporated

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
RESPONDERS GUIDEBOOK FOR RADIOACTIVE MATERIALS TRANSPORTATION INCIDENTS
This Guidebook is to provide first responders to transportation incidents involving radioactive materials with practical information for dealing with the situation pending arrival of 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 ident.fied radioisotope in the incident.

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) 426-0656

Contract DOE-40-744-79
STATUS: Active NOTICE DATE: July 1979 START DATE: Mar. 1979 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $18,500

ACKNOWLEDGMENT: DOT

12 308311
DEVELOPMENT OF A PROTOCOL AND COMBUSTION/EXPOSURE CHAMBER FOR EVALUATION OF COMBUSTION PRODUCT TOXICITY FROM BURNING TRANSPORTATION VEHICLE INTERIOR MATERIALS
The incapacitating effects of combustion gases and smoke are generally recognized as a major contributing factor in fire fatalities. To address this problem, several agencies and laboratories have been involved in the development of a test method to assess the relative hazards of burning materials. The principal objective of this research is to formulate and evaluate a simplified and meaningful test protocol, along with an appropriate combustion and exposure chamber, for primary evaluation of toxicity and smoke generation of materials used in transportation vehicles. This, the third year of research is concerned with the evaluation of the test method and comparison of data with other test methodologies principally one developed by the National Bureau of Standards.

PERFORMING AGENCY: Utah University, Flammability Research Center
INVESTIGATOR: Galster, WA Tel (801) 581-3502
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: McGuire, CW Tel (202) 476-4458

Contract DOT-OS-60174
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1976 COMPLETION DATE: Jan. 1980 TOTAL FUNDS: $126,000

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, is not explicitly defined to date but is expected to 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.

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. 1980 START DATE: 1979

ACKNOWLEDGMENT: Association of American Railroads Technical Center

13 170609
PARAMETRIC STUDIES FOR RAILROAD ELECTRIFICATION AND TRACTION
This effort includes site specific system studies of various train consists for passenger and freight transportation. A simple computer train operation program is available permitting us to simulate traction equipment parameters and speed profiles along the route in order to achieve the specified goals. Traction equipment characteristics and their interaction with the assumed speed profiles are evaluated. Speed profiles are modified to match the anticipated track improvements. The work centers around the Northeast Corridor, though studies of other high density lines are anticipated. Findings are published, at frequent intervals, in the form of letter reports to the sponsor.

PERFORMING AGENCY: Jet Propulsion Laboratory
INVESTIGATOR: Macie, TW Tel (213) 354-4432
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

Contract DOT-AR-30006
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Oct. 1977 COMPLETION DATE: Sept. 1980

ACKNOWLEDGMENT: FRA

13 170653
HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEED
This study concerns the performance of the "overhead contact system/pantograph system" at high speeds and also the problem of power transmission under severe loading conditions. The first remit was to prepare a mathematical model for the study of the "overhead contact system/pantograph system". A first recommendation has been produced for pantographs and lightoverhead contact systems for high voltage current. Exact recommendations concerning the same problem are now being prepared. The study of other sections of the programe of work is progressing (measuring equipment to determine the upward contact force, determination of the currents acceptable at the point of contact, etc.).
Nine reports have been published to date. Question A129.

PERFORMING AGENCY: International Union of Railways
RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

13 179334
ELECTRIFICATION OF HIGH-DENSITY LINES
The 4R Act provides loan guarantees for electrification of high-density lines if it can be shown economically beneficial. The 300-mile line between Harrisburg, Pa., (Enola) and Pittsburgh, Pa., (Conway) carries the heaviest freight tonnage of any U.S. route. This segment and certain segments of presently electrified lines east of Harrisburg will be studied in terms of projected traffic levels; projected costs of electric power and diesel fuel; most effective methods of electrified operation; electric power supply and catenary system; effects of electrification on signals and communications; and financial implications of electrification.

PERFORMING AGENCY: Gibbs and Hill, Incorporated
INVESTIGATOR: Hulme, WN Tel (212) 760-4697
SPONSORING AGENCY: Consolidated Rail Corporation
RESPONSIBLE INDIVIDUAL: DeGennaro, RE Tel (215) 594-1000

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1977 COMPLETION DATE: 1979

15 129701
METRO IMPACT STUDY
As part of its ongoing programs, the Metropolitan Washington Area Council of Governments is conducting for UMTA an assessment of impacts of the METRO rail system in the Washington area. The program is somewhat narrower in scope than the BART Impact Work, concentrating on traveler impacts.

PERFORMING AGENCY: Metropolitan Washington Council of Governments, 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) 426-2360

Contract DC-09-7001
STATUS: Active NOTICE DATE: Aug. 1979 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 scheduled opening in later 1978 concentrates on obtaining "before" and base-case data and on the impacts of construction. Operational impact measurement begins 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) 426-2360

Contract GA-09-7001
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1983 TOTAL FUNDS: $750,000

ACKNOWLEDGMENT: UMTA

15 179338
THE URBAN TRAVEL DEMAND FORECASTING PROJECT: WORKSHOP FOR TRAVEL DEMAND POLICY ANALYSIS
This research is a supplement to a previously completed project which was funded to develop and apply behavioral travel demand forecasting models for different policy issues. The project prepared a data of behavioral travel demand models. The investigators carried out validation tests of the data and models, and applied these techniques to selected policy analyses in cooperation with local transportation authorities. In addition, with UMTA, Software Systems Division funding, they designed and conducted a short course in forecasting methods for planning officials. This supplemental grant will allow for further validation of the models by providing easy access to project data and software, through documentation, formatting and support, so that researchers and planners from other regions may supplement, check and generalize project findings.
REFERENCES:
Demographic Data for Policy Analysis McFadden, D; Cosslett, S; Duguay, G; Jung, W, June 1977
Disaggregated Supply Data Computation Procedures Reid, FA, June 1977
Attitudes, Beliefs, and Transportation Behavior Johnson, MA, Aug. 1977
Survey Data and Methods Johnson, MA, Oct. 1976
Forecasting Travel Demand in Small Areas Using Disaggregate Behavioral Models: A Case Study, Johnson, MA; Adiv, A, Aug. 1977
Demand Model Estimation and Validation McFadden, D; Talvitie, AP, June 1977

PERFORMING AGENCY: California University, Berkeley
INVESTIGATOR: McFadden, D Tel (415) 642-3304
SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, DAR74-20392 A06
RESPONSIBLE INDIVIDUAL: Miller, TC Tel (202) 634-1785

Grant DAR74-20392 A06
STATUS: Active NOTICE DATE: June 1979 START DATE: July 1978 COMPLETION DATE: June 1979 TOTAL FUNDS: $1,002,364

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1917)

15 179339
LABORATORY TESTING OF PREDICTIVE MODELS
This project will improve the existing Integrated Transportation and Land Use Model Package (ITLUP) developed previously by a team headed by the present principal investigator. Several existing models will be incorporated into ITLUP, including a basic employment model, a nonbasic employment model based on the Harris model, and a residential model disaggregated by income class based on the DRAM model, a derivative of IPLUM developed by the principal investigator under a previous grant. Several other existing models will be evaluated for possible integration, including modal split models, multipath assignment procedures, and air pollution emission and diffusion models. In addition, an attempt will be made to develop an operational housing characteristics model, and to incorporate simple models to investigate the energy consequences of different urban forms and transportation networks. Finally, the improved package will be used to test the impact of several policy options: Several low capital options in urban transportation will be tested such as gasoline taxes or quotas, parking taxes, parking space restrictions, and commuter taxes. The difference in the land use impacts of rail transit lines and busways will also be tested.

PERFORMING AGENCY: Pennsylvania University, Philadelphia, School of Arts & Sciences, City and Regional Planning
INVESTIGATOR: Putman, SH
SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR73-07840 A04

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: $99,950

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1344 1)

15 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

This project will recommend procedures to be used in predicting the impacts of high capital transit. The purpose is to offer guidance in the preparation of Alternatives Analyses required by UMTA. The project focuses on those impacts which can be used by UMTA to decide which urban corridors are most worthy of study and which transit alternatives are most cost-effective.

PERFORMING AGENCY: Charles River Associates, Incorporated
INVESTIGATOR: Dunbar, F Tel (617) 266-0500 Winston, B
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Spear, B Tel (617) 494-2276

Contract DOT-TSC-1572
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Aug. 1978 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $139,077

ACKNOWLEDGMENT: Charles River Associates, Incorporated

15 192693
EMPIRICAL ESTIMATION OF A PROBABILISTIC RESIDENTIAL LOCATION MODEL AND APPLICATION TO VALUE CAPTURE/JOINT DEVELOPMENT POLICIES

Development of a framework for the integratated forecasting of travel demand and residential property values. Consistency of this method with current travel demand forecasting procedures. Computer programming and testing of the method with Chicago area data. Application of the method to policy simulation experiments focused on the value capture/joint development potential of rapid transit plans.

REFERENCES:

Probabilistic Choice Framework for the Integrated Forecast of Travel Demand, Residential Land Use and Property Values, Anas, A, Jan. 1978

The Effects of Transporation-Land Use Policies on Housing Values and Household Welfare, Anas, A, Nov. 1978

PERFORMING AGENCY: Northwestern University, Evanston, Technological Institute, 5313-650; Northwestern University, Evanston, Department of Civil Engineering
INVESTIGATOR: Anas, A Tel (312) 492-7629
SPONSORING AGENCY: National Science Foundation

Grant SOC77-18264
STATUS: Active NOTICE DATE: Dec. 1978 START DATE: Sept. 1978 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: Northwestern University, Evanston

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 & Communic, Can, 3607
INVESTIGATOR: Soots, V
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1980 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 conservation and 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 conservation measures.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Roos, D
SPONSORING AGENCY: Department of Energy

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: June 1978 COMPLETION DATE: Aug. 1980

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
ALTERNATE FUELS FOR MEDIUM-SPEED DIESEL ENGINES
Under a DOE contract, SWRI began work to investigate the use of alternate fuels in medium-speed diesel engines. This class of engines, characterized by a rated speed between 800 and 1200 RPM, is used in several types of essential transport functions--rail, river and intercoastal shipment of goods. The intent of this project is to demonstrate the ability of this type of diesel engine to operate on certain alternate or non-standard fuels and to define the performance, piston ring wear, and emissions characteristics of the engine for such operation. In the initial phase of the program, two categories of fuel are being evaluated. These categories are defined as (1) off-specification diesel fuels and (2) non-diesel fuels. (1) includes fuels with one or more properties which do not lie within the currently accepted range of specifications; (2) includes fuels such as alcohol, gasoline and non-diesel type liquid fuels derived from coal.

PERFORMING AGENCY: Southwest Research Institute, Engine Research & Development, Dept of Engine & Vehicle Res, 11-5361
INVESTIGATOR: Storment, JO Tel (512) 684-5111
SPONSORING AGENCY: Department of Energy, Asst Secretary for Cons & Solar Appl, Off of Trans Programs; Federal Railroad Administration; Association of American Railroads
RESPONSIBLE INDIVIDUAL: Alpaugh, R Tel (202) 376-1860

Contract EM-78-C-01-4266
STATUS: Active NOTICE DATE: July 1979 START DATE: July 1978 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: $472,000

ACKNOWLEDGMENT: FRA

17 059062
SOFTWARE DEVELOPMENT FOR THE PROJECTION OF COMMODITY FLOW PATTERNS
The objective is for the development of data reduction and analysis programs to project commodity flow patterns as an input to development of a national transportation simulator capability.

PERFORMING AGENCY: Transportation Systems Center
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Chamberlain, C Tel (617) 494-2087

In-House
STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: $70,000

ACKNOWLEDGMENT: TRAIS (R6831)

17 138526
MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM
To develop and implement an automated freight car scheduling system. A prototype capability will first be developed. This research and demonstration project will establish the feasibility and determine the operational benefits of automated freight car scheduling. The project will provide considerable impetus to interline freight car scheduling reports and demonstrations will be made available to the railroad industry and the procedures, computer programs and related documentation of MoPac's Transportation Control System including the automated freight car scheduling system will be made available to interested railroads.
REFERENCES:
State-of-the-Art Survey Apr. 1976
Project Work Plan Mar. 1976
System Functional Requirements July 1977
System Performance Measurements Feb. 1978

PERFORMING AGENCY: Missouri Pacific Railroad Company
INVESTIGATOR: Sines, GS
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608

Contract DOT-FR-65139
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1975 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $5,500,000

ACKNOWLEDGMENT: FRA

17 159625
FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM-STRUCTURING ORGANIZATIONAL CONTROL MECHANISMS
The program shall complete a report on organizational control mechanisms to facilitate integrated car management. It shall translate the basic concepts of this report into a presentation which it will deliver to management personnel on selected railroads. The program will also investigate the feasibility of developing a management game embodying the basic concepts of the report and if feasible, will work to develop such a game for use by railroad middle and upper level managers. If such a game is deemed not feasible, the Program will work to develop more detailed sample procedures to implement the report's basic concepts.

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) 426-2608 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 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 the system devised by Task Force 4 of Phase II. Part of the promotion will entail specifying the interrad balancing mechanism and 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.

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) 426-2608 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: July 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $100,000

ACKNOWLEDGMENT: AAR

17 159631
RAILROAD OPERATIONS MODULAR PROCESSING SYSTEMS (ROMPS)
ROMPS is a mini-computer based telecommunications data processing system for smaller railroads which will assist them in automating many clerical railroad functions presently undertaken manually. Data is input through CRT terminals located at each short line railroad. An on-line data base provides each road with car location and management information inquiry responses. ROMPS provides data to the AAR TRAIN II system for improved informational content of the national freight car information system.
REFERENCES:
Railroad Operations Modular Processing System: System Design Summary, Apr. 1978, NTIS PB-285442/AS

PERFORMING AGENCY: Ocean Data Systems Incorporated
INVESTIGATOR: Bochner, A Tel (301)881-3031
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $700,000

ACKNOWLEDGMENT: AAR

17 159648
NETPAC/2 PROJECT COST AND RESOURCE ACCOUNTING COMPUTER PROGRAM DEVELOPMENT
To produce a resource and cost accounting system for project planning and control to be added to an existing critical path time program (NETPAC/1). The program will produce 7 report classes (1) progress data (2) project cost (3) cost of work (4) cumulative cost (5) cost histogram (6) resource histogram (7) account code. The program is intended to provide reasonable accurate but timely cost and resource usage information on demand. 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 160402
FAST DATA MANAGEMENT AND ANALYSIS
To provide a data management system for the Facility for Accelerated Service Testing (FAST) test data, conduct appropriate data analysis and evaluation efforts, and report the resultant conclusions. FAST data analysis and report will provide the foundation for engineers in the railroad industry to make technical and economic decisions to update and improve railroad design, maintenance, and operations practices.

PERFORMING AGENCY: Association Of American Railroads, 1920 L Street, NW
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Gray, DE Tel (202) 755-1877

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: $728,307

ACKNOWLEDGMENT: TRAIS

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 produce a 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.

PERFORMING AGENCY: California University, Berkeley
INVESTIGATOR: Abbott, RK Tel (415) 843-2740 X6450
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract AR-74348
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1977 COMPLETION DATE: Jan. 1980 TOTAL FUNDS: $400,000

ACKNOWLEDGMENT: FRA

17 192818
DEVELOPMENT OF A TRANSPORTATION TEACHING COMPUTER PACKAGE
The project will continue the development of a computer network model designed to aid in the teaching of transportation systems analysis. This program, TTP, is currently in use at M.I.T. by both graduate and undergraduate students.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Civil Engineering
INVESTIGATOR: Lerman, S Tel (617) 253-7110
SPONSORING AGENCY: Lilly Foundation, Eli Lilly and Company

STATUS: Active NOTICE DATE: Mar. 1979 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Massachusetts Institute of Technology

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: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1977 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: $1,395,000

18 059897
REGIONAL FINANCING ALTERNATIVES FOR MASS TRANSIT
The project will compare alternative regional financing mechanisms for mass transit in terms of their economic efficiency, equity, fiscal impact, locational and land use incentives, and administrative feasibility. Six alternative revenue sources will be analyzed and evaluated according to the following criteria; 1) property (and land) taxes; 2) income taxes; 3) sales taxes; 4) user charges; 5) intergovernmental grants; and 6) general revenues.

PERFORMING AGENCY: Syracuse University
INVESTIGATOR: Puryear, D
SPONSORING AGENCY: Urban Mass Transportation Administration, NY-11-0003
RESPONSIBLE INDIVIDUAL: Jasper, N Tel (202) 426-0081

Grant NY-11-0003
STATUS: Active NOTICE DATE: Aug. 1979 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, Nov. 1977
Railway Costing Study, Phase II, Draft Canadian Transport Commission

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, PRO-828
INVESTIGATOR: Lake, RW Tel (613) 547-5777 Schwier, C Roney, MD Turcot, MC Boon, CJ
SPONSORING AGENCY: Canadian Transport Commission
RESPONSIBLE INDIVIDUAL: Lake, RW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1977 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $120,000

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 193780
RAIL SYSTEM INVESTMENT ANALYSIS
Study objective is to provide DOT with background information on rail investment for use in developing policies on capital assistance to railroads, and to provide manuals and case studies to guide government officials and railroads in computing the internal rate of return (IRR) for railroad capital investments. Research included literature search; field work at 13 railroads; computation of IRR corporate perspective for 63 sample projects; computation of IRR from national economy perspective for 27 sample projects; assessment of adequacy of railroad revenues using financial ratios; and determination of railroad's required returns on investment and equity using the comparable earnings approach.
REFERENCES:
Rail System Investment Analysis: Literature Search Ernst and Ernst; Banks (RL) and Associates, Inc., 1978, RRIS 18 188696
Rail System Investment Analysis: Description of the Railroad Investment Process, Ernst and Ernst; Banks (RL) and Associates, Inc., 1978, RRIS 18 188697
Rail System Investment Analysis: Financial Analysis of Investment Projects from Individual Corporate Perspective, Ernst and Ernst; Banks (RL) and Associates, Inc., 1978, RRIS 18 188698
Rail System Investment Analysis: Analysis of Investment Projects from the Railroad Industry Perspective, Ernst and Ernst; Banks (RL) and Associates, Inc., 1978, RRIS 18 188699
Rail System Investment Analysis: Sample Evaluation of a Track Rehabilitation Project, Ernst and Ernst; Banks (RL) and Associates, Inc., 1977
Rail System Investment Analysis: Manual for Determining Return from the Individual Corporate Perspective, Ernst and Whinney: Banks (RL) and Associates, Inc., 1979
Rail System Investment Analysis: Sample Evaluation of a Locomotive Rebuilding Project, Ernst and Whinney; Banks (RL) and Associates, Inc., 1979
Rail System Investment Analysis: Manual for Determining Return from the National Economic Perspective, Ernst and Whinney; Banks (RL) and Associates, Inc., 1979
Rail System Investment Analysis: Sample Evaluation of a Track Rehab Proj from the National Economic Perspective, Ernst and Whinney; Banks (RL) and Associates, Inc., 1979
Rail System Investment Analysis: Analysis of Investment Projects from the National Economic Perspective, Ernst and Whinney; Banks (RL) and Associates, Inc., 1979

PERFORMING AGENCY: Ernst and Whinney
INVESTIGATOR: Lutes, GS Tel (202) 862-6334
SPONSORING AGENCY: Office of the Secretary of Transportation
RESPONSIBLE INDIVIDUAL: Harman, JE Tel (202) 426-4220

Contract DOT-OS-60097
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1975 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $473,101

ACKNOWLEDGMENT: Ernst and Ernst

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: Apr. 1979 START DATE: Aug. 1977 COMPLETION DATE: Oct. 1979

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: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: May 1980 TOTAL FUNDS: $64,390

ACKNOWLEDGMENT: Massachusetts Institute of Technology

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: Active NOTICE DATE: Feb. 1980 START DATE: June 1973 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: $222,959

ACKNOWLEDGMENT: TRAIS (PR# PUR-2-30685)

20 058467
DATA REQUIREMENTS ON INTERCITY FREIGHT DEMAND PLANNING
The objective is a critical review of present data sources and reporting methods. Emphasis is on the usefulness of the data in calibration and estimation of existing forms of demand models and recommendations on better sources or collection techniques for more effective forecasting of commodity flows. Data of primary concern are indications of shippers' choice; commodity attributes; production, consumption and pricing of commodities; and transportation attributes. A careful review of the form of the model and variables needed to predict modal choice by shippers is made. Various methods of data collection, processing, storage and retrieral and their related costs are evaluated for achieving the goals.
REFERENCES:

Design of a Structure and Data Analysis Scheme for Intercity Freight Demand Forecasting, Chung, C; Roberts, PO, CTS Rept. #75-15, 154 pp, Sept. 1975

A Commodity Attribute Data File for Use in Freight Transportation Studies, Samuelson, RA; Roberts, PO, CTS Rept. #75-20, 27 pp, Nov. 1975

Developing Freight Origin-Destination Data for Use in Freight Planning, Roberts, PO, CTS Rept. #76-3, Feb. 1976

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies
INVESTIGATOR: Roberts, PO Tel (617) 253-7123
SPONSORING AGENCY: Transportation Systems Center, OP-509
RESPONSIBLE INDIVIDUAL: Wright, DG Tel (617) 494-2196

Contract DOT-TSC-1005 (CR)
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Apr. 1975 TOTAL FUNDS: $38,000

ACKNOWLEDGMENT: TRAIS, Massachusetts Institute of Technology

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: Mar. 1979 START DATE: Jan. 1977 TOTAL FUNDS: $292,584

ACKNOWLEDGMENT: Massachusetts Institute of Technology

20 083533
ECONOMIC ANALYSIS OF THE UNITED STATES GRAIN EXPORTING SYSTEMS
Evaluate private versus state trading systems for grain with respect to: Returns to producing, marketing and processing firms; relative market power between countries with different systems; comparative advantage; relative efficiencies of time, farm and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their respect to commodity futures markets. Evaluate alternative export marketing techniques and strategies with respect to: the adequacy of the U.S. system of grades and standards; the logistics of costs of marketing and transportation. Comparative data will be collected on Canadian and U.S. grain handling costs and procedures. Structural and policy differences will be compared wherever possible. System performances will be compared on the basis of handling costs and producer returns. Analysis of capital investment decisions in the two systems will also be made. Data on price quality relationships for wheat will be collected and analyzed to determine the validity of present grading factors. North Dakota production data will be assembled on a county basis for use in a transportation model designed to analyze various rate policies for west bound shipments of wheat and barley. Existing transportation rates will be used to generate optimal flow patterns. Alternative rate policies will be compared to existing rate solutions. Work was continued on a study of the Canadian grain marketing system. A Master's thesis was completed on a descriptive analysis of Canadian grain marketing policies. This study also made a comparative analysis of the U.S. and Canadian marketing systems at the county level. A study of the economic significance of quality factors in North Dakota was conducted, using yield and quality data from the branch experiment stations throughout North Dakota. This study also evaluated major varietal differences and analyzed the interrelationships among quality factors.
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

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND01354
INVESTIGATOR: Anderson, DE
SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: July 1979 START DATE: July 1977 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: North Dakota State University (CRIS 0060238)

20 099645
EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE
Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticites for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate tech-

niques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniform. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

REFERENCES:

Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing and Transportation Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

Nature and Quality of Livestock Transportation Services Used by Shippers, Hoffman, LA, Transportation Committee of American Nat'l Cattlemen's Assn, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Conr Quality Conference, Champaign, Illinois, Oct. 1973

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S., pp 18-24

PERFORMING AGENCY: Washington State University
INVESTIGATOR: Casavant, KL
SPONSORING AGENCY: Department of Agriculture, NEA-14-125-53-01-X2

Contract 12-17-04-8-917-X
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: June 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41788 46 286117)

20 099646
EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

REFERENCES:

Livestock, Trucking Services: Quality, Adequacy and Shipment Patterns, Hoffman, LA; Boles, PP; Hutchinson, TQ, Economic Res Service, AER-312, Oct. 1975

Operations of For-Hire Livestock Truckers Boles, PP, Economic Res Service, AER-342, July 1976

Impact of Higher Gasoline Prices on Rural Households, Hoffman, LA, Economic Res Service, 4 pp, Apr. 1976

Discussion of a Sequential Link Approach to Evaluating Transportation Facility Adjustments, Gerald, JO, Sou. Journal of Agric Econ., V8 N1, pp 35-37, July 1976

Estimation of Demand for Transp of Agric Commod Miklius, W; Casavant, KL; Garrod, PV, Amer Journal of Agric Econ, V58 N2, pp 217-223, May 1976

PERFORMING AGENCY: Economic Research Service
INVESTIGATOR: Gerald, JO Hutchinson, TQ
SPONSORING AGENCY: Department of Agriculture, NEA-14-125-11-00

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41660)

20 138364
EVALUATION OF ALTERNATIVE TRANSPORTATION SYSTEMS AND POLICIES FOR RURAL MISSOURI

Estimate transport requirements to 1985 and 1990. Estimate economic effects of alternative rural transport systems. Assess state and federal roles in setting transport policy and planning and regulating transport systems. Study economic effects of alternate plans and policies on carriers, shippers and rural areas. Present Missouri rural transport system will be described. Demand for services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated modal combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. Published study of grain production and marketing and projection of transportation demand for grain movement to 1985 in 16 county areas of Northwest Missouri. Purpose was to determine a grain distribution system yielding highest net return to producers and marketers. Results indicated possibility of contribution of up to $2.6 million annually to farmer net income, before considering transportation and elevator upgrading costs, through assembly and storage adjustments to permit larger volume shipments in long-haul transport. Published study of Missouri's transportation system which documents the need for increased attention to upgrading of agricultural and rural transportation facilities and services. This report serves as an information bank for the ongoing transportation policy work of regional, state and community agencies and university researchers, and for educational efforts in the field of transportation policy, planning and public issues. Completed work on projection of estimated transportation demand for movement of grain and fertilizer in Missouri, by counties, to 1990. These projections provide a base for further work on rural transportation systems in Missouri, for study of barge transportation potential on the Missouri River-Mississippi River system (MO-40-2), and for Missouri input to NC-137 (MO-40-1).

REFERENCES:

Missouri Rural Transportation in Jeopardy Moser, DE, Missouri University, Extension Division, Vol. 18; No. 8, Aug. 1975

An Economic Analysis of Alternative Grain Transportation Systems in Northwest Missouri, Salomone, D; Moser, DE; Headley, JC, Univ Missouri, Agricultural Experiment, Stat Res Bulletin 1019, 138 p., 77

Missouri's Transportation Systems and Policies for Rural Missouri, Moser, DE; et al, University of Missouri, Columbia, 351 p.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040
INVESTIGATOR: Moser, DE Rudel, R
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: July 1979 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068730)

20 138367
NATIONAL TIMBER AND WOOD PRODUCTS REQUIREMENTS

Analyze the present and prospective consumption of timber and wood products in the national economy by components and relate these

requirements to the national to the national timber supply situation. Develop and apply sampling systems to measure quantities consumed in construction, manufacturing, shipping, and other major end uses. Develop and apply accurate models which monitor shifts in wood raw materials use. Develop and apply techniques for converting wood product consumption estimates into estimates of timber supply requirements. PROGRESS REPORT: A study of nonresidential and nonhousekeeping building construction activity found it increased from 1 billion square feet in 1961 to 1.7 billion square feet in 1973. The largest increase was in commercial buildings such as stores, warehouses, and office buildings. Nonhousekeeping, hospital, and other buildings also showed increases. Construction of Industrial, religious, and educational buildings declined during the period. Lumber, plywood, hardboard, and particleboard usage in these structures increased during the period, while glue-laminated lumber, insulation board, and structural wood-fiberboard decreased. Construction value for all building increased from $16.05 per square foot of floor area in 1961 to $24.15 in 1973--an average annual rate of 3.5 percent. A computer retrieval and compiling system has been established, containing primary wood processing mill capacity, type, and location for analysis of trends and regional patterns in timber requirements. Annual woodpulping capacity in the U.S. has increased from 4.4 to 51.5 million tons since 1920, with average mill capacity increasing nearly ten times to 426 tons per day. Kraft pulp capacity now dominates the industry with the South leading in total pulping capacity. Panelboard production capacity data have been collected.

PERFORMING AGENCY: Forest Products Laboratory, FPL-4202
INVESTIGATOR: Stone, RN Marcin, TC Reid, WH
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0042894)

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. Substantial progress has been made toward the completion of an estimate of the demand for rural transportation in the State of Michigan. Appropriate methodology has been developed and is currently being implemented to make demand projections in 1985, 1990 and 2000 under alternative domestic and foreign demand scenarios. Michigan State has taken a leadership role in developing appropriate methodological procedures to be used by other stations cooperating in the NC-137 regional project. Specific results will be forthcoming on projected quantities of grain requiring transportation services in the State of Michigan. In addition, we are in the initial stages of research directed toward the estimation of an optimal rural freight transportation storage and distribution system in a selected geographical region of Michigan. Also completed was a study of the national income and employment impacts of abandonment of specific Michigan railroad branch lines.

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: July 1979 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. An economic analysis of the social costs of regulation of grain rail rates in the Upper Midwest was completed. This analysis is contained in a PhD thesis which has been approved. A manuscript summarizing this research is being prepared for publication as a technical bulletin. Considerations other than the cost of service have been primary factors in determining rail rates on grain. Social costs from the current system of rail rates result when grain traffic is misallocated to less efficient transportation modes and from the income redistribution associated with monopolistic pricing. Cost-of-service estimates for truck and rail shipments of barley and wheat from country origins define a least cost or optimal transportation bill. The actual transportation bill on wheat and barley exceeded the least cost system by a considerable margin. The social costs associated with misallocation of wheat and barley shipments for rail to less efficient trucks are estimated at between $15 and $19 million. The social costs from the income redistribution effect of monopoly pricing are estimated at between $27 and $43 milion. These costs can be reduced or eliminated if railroad grain rates are shifted to a cost-of-service basis. The change in rail rates could be accomplished through an alteration of the ICC ratemaking rules. If grain rates were based on cost-of-service criteria, the social cost of traffic misallocation and eliminated or greatly reduced.
REFERENCES:
Railroads, Grain Transportation and the Interstate Commerce Commission, Martin, M; Dahl, R, Minnesota Agricultural Economist; UMN-Agr Extension Service
A Transportation Issue-Lock and Dam 26 Martin, M; Dahl, R, Minnesota Agricultural Economist; UMN-Agr Extension Service
An Economic Analysis of the Social Cost of Regulated Value-of-Serv Wheat & Barley Rail Rates in the Upper Midwest, Martin, M

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: July 1979 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. Completed projection of transportation requirements for movement of grain and fertilizer, by Missouri counties, to 1985 and 1990. Supplied these data as Missouri contribution to regional work under NC137. Providing leadership to NC137 in description and evaluation of state transportation regulation and policy functions as they influence the economic activities of agricultural and rural areas.

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: July 1979 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070255)

20 164822
ONTARIO FREIGHT MODEL
The design of this model will meet the following specific objectives: The development of an understanding of commodity movements and factors influencing commodity movements to and from, through and within the Province of Ontario; assistance to the planning of capital improvements to the transportation network; the provision of data and expertise to assist in the development policy for the regulation of movements on the transportation network; the production of a tool to aid in the effective operation of the existing system. The project is divided into 8 phases: (1) Review of Data and Existing Work, (2) Selection of Commodities, (3) Determination of Functional Relationships, (4) Definition of the Network, (5) Model Development and Timing, (6) Model testing, (7) Monitoring model usage, and (8) Model review. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can
INVESTIGATOR: Kher, R
SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Dec. 1976 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 179664
EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS
Estimate rural freight transportation requirements to 1985 and 1990 and estimate the optimal rural freight transportation, storage and distribution system. Historical data on agricultural production and input usage by Texas subregions will be gathered. Models will be developed to provide estimates of agricultural output and input usage by subregion to 1985 and 1990. With this data, spatial and temporal flow patterns of agricultural products and inputs will be estimated. Transportation cost and rate data will be gathered by mode as it relates to projected agricultural output and input flows. With supply and demand estimates and storage, processing and transportation costs, normative spatial and temporal flows will be resolved with spatial equilibrium models. Optimal number, size and location of storage, processing and distribution facilities will be resolved. The social and economic costs and benefits with alternative configurations will be evaluated. Rational grain transportation policy is dependent upon knowledge of existing flows and utilized transportation modes. In collaboration with other NC-137 participants a national grain flow study is being accomplished for the calendar year 1977. Based on surveys and personal interviews the complete grain flow structure is being developed. Export elevators, flour and corn millers, soybean processors, feed mills, feedlots and wet corn millers within Texas have been interviewed. From this information the intrastate flow patterns will be constructed.

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: Feb. 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. Projections of transportable surplus wheat, corn, sorghum, oats, barley, peanuts and soybeans have been made to 1984, 1989 and 1999 for four geographical regions in Oklahoma.

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: July 1979 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. Production projections for corn, soybeans, wheat and oats to 1984, 1989 and 1999 have been completed by county, CRD and the state of Ohio. Two alternative projections were made. The "baseline scenario" is linked to USDA/ERS projections. Ohio grain production is projected to 494.2 million bushels in the baseline scenario and 565.0 million bushels in the trend scenario in 1985. This represents a decrease of 2% from the 1973-77 average in the baseline scenario and an increase of 12% in the trend scenario. Work has begun on the projections of livestock numbers to 1985, 1990 and 2000. Estimates of feed grain requirements by livestock class have been completed. Feed grain consumption will be subtracted from grain production to estimate the marketable surplus of grain for each CRD in Ohio.
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

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 Research Service, CSRS OHO

STATUS: Active NOTICE DATE: July 1979 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071704)

20 179667
EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS
Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal grain transportation, storage, and distribution system which can maximize farmers' benefits. Evaluate the economic effects of alternative railroad ownership and financial policies. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural commodities. Objectives 1, 2, and 3 will be completed by using a multi-stage transportation model. This model is based on a combinational algorithm, which compares alternative grain distribution systems and selects the optimal configuration. Interregional mathematical programming models are applied for Objective 4. This programming model determines the amount and directional flows of grain between producing and consuming regions. Completion of cost estimation for trucking grains to market. Completion of truck-barge cost estimation for shipping Montana Grain to domestic and export markets. Completion of rail cost estimates for alternative size of train (single-car, 10-cars, 25 cars and 50 cars). Calculation of mileage matrices and rail cost matrices associated with grain transportation. Projected quantities of grain production and sales in Montana for 1984/85, 1989/90 and 1999/2000 by using a time trend regression analysis. Mathematical model for this study was developed and compiled in computer for final computation.

REFERENCES:

Shipment Patterns of Montana Wheat and Barley Under Alternative Rail and Truck-Barge Rate Structures, Koo, WW; Cramer, G, Montana State University, Staff Paper 76-26

Shipping Patterns of Montana Grain Koo, WW; Cramer, G, NOW, Agricultural Experiment Station, Montana State Univ

A Study of the Interaction of Weather with Alternative Environmental and Grain Reserve Policies, Koo, WW; Bogges, WG; Heady, EO

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB00077
INVESTIGATOR: Koo, WW
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MONB

STATUS: Active NOTICE DATE: July 1979 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-007118)

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.

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: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Oct. 1979 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.

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. 1980 START DATE: June 1978 COMPLETION DATE: Oct. 1980

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: Kullman, B Tel (617) 354-0167 Roberts, P
SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Spicher, R Tel (202) 389-6741

NCHRP HR 20-17
STATUS: Active NOTICE DATE: Apr. 1979 START DATE: Apr. 1979 COMPLETION DATE: June 1980 TOTAL FUNDS: $50,000

ACKNOWLEDGMENT: Cambridge Systematics, Incorporated, National Cooperative Highway Research Program

20 196118
CAPACITY AND LOCATION OF GRAIN EXPORT FACILITIES IN LIGHT OF CHANGING FOREIGN DEMAND CONDITIONS

Identify and quantify those factors which affect the efficiency of the U.S. grain export system. Develop a unified multicommodity grain transshipment model linking the U.S. and foreign grain marketing systems. Determine optimum patterns of grain flows under alternative foreign demand scenarios. A mathematical programming based grain transshipment model which includes logistical constraints in grain export system, will be used to determine optimum flow of grain from U.S. producing regions to foreign demand points through the ports. The study builds upon U.S. grain transshipment models and focuses on adding a detailed export component to treat movements from U.S. ports to foreign destinations. Wheat, corn, soybeans and an aggregate of other grains are analyzed simultaneously. Project is in its initial stages. The general approach has been determined. Specifically, a four season-three commodity (wheat, corn, and soybeans) model will be developed. An algorithm (GNET) has been chosen which will enable the simultaneous solution of three models to incorporate the fact that the three commodities compete for port and handling facilities. Work is now concentrating on data collection. A large data set used in a previous study at Virginia Polytechnic Institute has been obtained and will form the basis of the domestic component of the models. An extensive analysis of ocean freight rates is mostly completed. This will be used to generate transport data for the export component of the models. World regions have been selected and production and consumption data are being collected. The base year for the analysis is 1976. The intent is to initially make each of the three separate commodity models operational and then link them together. During this process, data will continue to be refined.

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND-801-15-46
INVESTIGATOR: Binkley, JK Thompson, RL McCarl, BA
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IND

Contract 801-15-46

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: May 1978 COMPLETION DATE: May 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0076421)

20 308327
RAIL GRAIN CAPTIVITY STUDY

To determine the extent to which shippers of corn and soybeans in two study areas in Iowa are subject to rail market power. This will be accomplished by examining the effects a variety of rail pricing schemes would have on grain shippers, who will be grouped on the basis of several characteristics.

PERFORMING AGENCY: Iowa State University, Ames, Agricultural Experiment Station
INVESTIGATOR: Baumel, CP Tel (515) 294-7318
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Hardesty, F Tel (202) 426-2608

Contract DOT-FR-9104
STATUS: Active START DATE: June 1979 COMPLETION DATE: July 1980 TOTAL FUNDS: $78,000

ACKNOWLEDGMENT: FRA

20 308328
EFFECTIVENESS OF COMPETITIVE FORCES TO LIMIT RAIL RATE INCREASES ON HARD WINTER WHEAT TRAFFIC

To determine the effectiveness of intramodal and intermodal competition to limit rail rate increases on hard winter wheat moving for export. Possible rail rate increases by one or more railroads will be examined to determine the probable effects on those carriers' traffic, revenues and variable costs.

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics
INVESTIGATOR: Fuller, SW Tel (713) 845-3031
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Hardesty, F Tel (202) 426-2608

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Nov. 1979 COMPLETION DATE: Nov. 1980 TOTAL FUNDS: $27,000

ACKNOWLEDGMENT: FRA

21 138527
CHICAGO TERMINAL PROJECT
To increase the reliability, speed and efficiency of car movements through a major existing railroad terminal so that the quality and saleability of rail transportation is improved, thereby attracting additional traffic improving employment opportunities. The improvements are to be made without capital expenditures. This objective is being achieved through a series of experiments involving changes in operating practices, labor agreements, rates, and regulations.

Co-sponsors include Railroad Labor Organizations, Association of American Railroads and Chicago Railroad Terminal Information System.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee
INVESTIGATOR: Adamson, E McGuire, T
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Organizations
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202)472-7280

STATUS: Active NOTICE DATE: Aug. 1979 START DATE: July 1976 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $495,000

ACKNOWLEDGMENT: FRA

21 157598
HOUSTON TERMINAL PROJECT
The purpose is to establish a cooperative railroad labor-management experimental program for the Houston Railroad Terminal. The Houston terminal continues to experience significant car delays. Therefore, the principal objective of this project is to improve the efficiency of rail terminal operations in the Houston area.

Additional funding provided by railroad labor organizations and Houston, Texas, area Railroads.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee
INVESTIGATOR: Joiner, D Tel (713)224-3662 Dessens, F Tel (713)224-3662
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Unions
RESPONSIBLE INDIVIDUAL: Collins, DM Federal Railroad Administration Tel (202)472-7280

Contract DOT-FR-75244 (CC)
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Aug. 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $195,000

ACKNOWLEDGMENT: FRA

21 157902
INTERMODAL FREIGHT SERVICES EAST OF THE HUDSON RIVER
The objective is to improve rail freight connections with truck and marine operations in the New York City and Long Island areas. In addition to New York City, the Long Island counties of Nassau and Suffolk will be involved in the study.

Announcement of this study was published in Traffic World, V 171, N 1 (July 4, 1977), P 18.

REFERENCES:
Transportation Priorities in New York State 1978
1978 Winter Storm Operations of the Long Island Railroad 1978

PERFORMING AGENCY: New York City Planning Commission, New York City Department of City Planning; New York State Department of Transportation, Planning Division
SPONSORING AGENCY: New York State Legislature

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 TOTAL FUNDS: $400,000

21 159624
FREIGHT CAR UTILIZATION RESEARCH-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 empty car distribution.

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) 426-2608 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: July 1977 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $976,000

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 operations analysis model and to assist one or more large railroads to apply this model on their 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 test any of the three terminal control and decision aids developed previously, provided that significant support from at least the operating department of a host railroad can be secured.

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)426-2920 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: July 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $185,000

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.

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) 426-2608 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: July 1977 COMPLETION DATE: Dec. 1980 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 ser-

vices 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: Active NOTICE DATE: Feb. 1979 START DATE: 1977 COMPLETION DATE: 1980 TOTAL FUNDS: $1,300,000

21 160398
SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEMS-PHASE 1
The findings of the initial phase of the Federal Railroad Administration's (FRA) Intermodal Systems Engineering Program are presented in five volumes. This work is intended to accelerate the rate of technological evolution in the equipment, facilities and subsystems used in intermodal rail freight transportation. The Phase I reports, entitled: "Exploratory Planning" include: (1) characterization of present intermodal equipment and operations, (2) identification of problems or opportunities where technology could be utilized to improve service, efficiency and return on investment (3) identification of improved equipment, subsystem, facility concepts having potential future application, (4) synthesis of alternate systems comprised of improved equipment in various combinations, (5) development of a methodology for assessment of the relative merit of system alternatives in quantitative terms under various operating scenarios, and (6) evaluation of synthesized systems and identification of most promising alternatives. The work reported was performed by two contractor teams working independently, each using slightly different approaches. Each contractor prepared separate reports. The findings from Phase I will be used in a more in-depth examination of the most promising alternatives during Phase II, Development Planning, scheduled for completion in October 1979.

PERFORMING AGENCY: Kearney (AT) and Company Incorporated; Peat, Marwick, Mitchell and Company
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Blanchfield, JR Tel (202) 426-0808

Contract DOT-FR-749-4273 (FFP)
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: Aug. 1977 COMPLETION DATE: 1980 TOTAL FUNDS: $500,000

ACKNOWLEDGMENT: TRAIS

21 170596
NETWORK FREIGHT FLOW
The project has two main thrusts: (a) railcar blocking and train scheduling models and (b) traffic assignment with elastic demand. Both investigations rely on the technique of formulating a large scale problem as a number of subproblems. Under (a) above, these are formulated as a set of dynamic programming/shortest path problems, and under (b) as a set of linear complementarity problems.
Final report to be issued in 1980.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Magnanti, TL Assad, AA
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: Crosby, RW Tel (202) 426-9638

Contract DOT-TSC-1058
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Oct. 1978 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: DOT

21 170620
RAILROAD CLASSIFICATION YARD DESIGN METHODOLOGY STUDY
This research is to establish a set of practical guidelines, procedures, and principles which will facilitate the process of classification yard design and engineering. Phase I includes preparation of a basic methodology in preliminary form. In Phase II these procedures will be applied to a case study involving a cooperating railroad. The third phase will comprise refinement and expansion of the preliminary methodology, and documentation in a user-oriented form.

PERFORMING AGENCY: SRI International, 6364-1
INVESTIGATOR: Wong, PJ Tel (415) 326-6200 X2104
SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development
RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel (202) 426-0855

Contract DOT-TSC-1337
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1977 COMPLETION DATE: Oct. 1980 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) 472-7280

Contract 75232
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: May 1976 COMPLETION DATE: Dec. 1980 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, Freight Car Utilization Program
RESPONSIBLE INDIVIDUAL: Wooden, DG Tel (202) 293-4165

STATUS: Active 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: Active 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: Active 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 establish a cooperative railroad labor-management experimental program in Conrail's Buffalo, New York terminal. The objective of the program 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: Conrail Task Force on Rail Transportation
INVESTIGATOR: Bethge, C Tel (716) 856-5940 Morey, J
SPONSORING AGENCY: Federal Railroad Administration; State Government of New York; Consolidated Rail Corporation; Railroad Labor Unions
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 426-6277

Contract DOT-FR-8186
STATUS: Active NOTICE DATE: Mar. 1980 START DATE: July 1978 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: $300,000

ACKNOWLEDGMENT: FRA

21 193785
A WEIGHT VARIABLE IMPACT DEMAND ANALYSIS FOR TOFC/COFC SERVICES
This research is an extension of "An Equilibrium Analysis of selected Intercity Freight Markets" which continues the exploration of trucks with double trailers versus TOFC Shuttle trains primarily as energy conservation alternatives. All data is being updated to 1972 levels. The number of city-pair markets to be studied has more than doubled. A model of logistics choice, developed under DOT, Office of University Research and first employed in a Federal Energy Administration Study, has been extensively modified to handle this new data to produce more detailed analysis of the cost functions. Final analysis of the market consequences in a competitive rail and highway market should allow for recommendations of specific policies, particularly in the fuel-saving area.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Roberts, P
SPONSORING AGENCY: Department of Energy

STATUS: Active NOTICE DATE: Apr. 1979 START DATE: Feb. 1978 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: Massachusetts Institute of Technology

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. 1980 START DATE: June 1978 COMPLETION DATE: Dec. 1980

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: Active NOTICE DATE: Feb. 1980 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: Active NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Feb. 1980 TOTAL FUNDS: $250,000

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 083511
IMPROVED SYSTEMS FOR SHIPPING AND HANDLING GROCERIES FROM MANUFACTURER TO WHOLESALE WAREHOUSE

Measure the cost for less-than-truckload (LTL) shipments of groceries from manufacturer to wholesaler and determine feasibility of reduced cost with a regional warehouse to store products of several manufacturers and ship full truckloads of grocery products from several manufacturers. Determine extent of less-than-truckload (LTL) receipts of grocery products at wholesale warehouses, measure labor productivity, detention charges, and other costs for LTL shipments. Develop a model based on actual productivity in receiving utilized truckloads of groceries, intermediate warehousing and transportation costs. Enlist the support and cooperation of the National American Wholesale Grocers Association, National Association of Food Chains, and Super Market Institute. The objective to develop a cost model for use of a second size unitized shipment program from manufacturer to distribution warehouse has been achieved. A report documenting findings in the study is in preparation and shows that implementation of a second size unit load is more costly than the current practice of repalletizing groceries at the distribution warehouse when a pallet size other than 48-by 40-inch is used. The objective to initiate a study on consolidation of retail store vendor deliveries in cooperation with the Food Distribution Laboratory was not initiated because of the lack of combined resources in the two laboratories. Another study was initiated on the possibility of unitizing truck transportation from manufacturer to distribution warehouse on slipsheets. Since truck transportation accounts for 70% of such deliveries, unitization of such shipments has the potential for substantial savings in marketing grocery products.

REFERENCES:

Methods for Receiving Groceries by Truck Bouma, JC, Nat American Wholesale Grocers' Assoc, Chicago, Proceedings, Mar. 1975

Six principles for developing saving in produce warehouses. Bouma, JC, Outlook Annual Report of the United Fresh Fruit and Veg Assn, Volume IV No. 1, pp 64-68, Jan. 1977

PERFORMING AGENCY: Agricultural Marketing Research Institute, Marketing Operations Research Laboratory, 1104-15864-001
INVESTIGATOR: Bouma, JC
SPONSORING AGENCY: Department of Agriculture

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Nov. 1973 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040668)

22 083516
CONTROL OF DAMAGE AND LOSS IN DISTRIBUTION

Find characteristics of commodities and items which are damaged in distribution, determine environment factors causing damage, propose methods of damage reduction and develop an economics of distribution loss control. Procure damage histories for specific commodities and items. Analyze package systems used in connection with damage history in the laboratory and in the field. Using established design procedures, redesign packages to reduce loss. Establish total economic advantages in use of redesigned package including resource use and the ecological impact. Using information assembled in case by case approach, establish generalities relating to damage control. Develop sub-projects to explore specific problems in the areas of cushion properties, distribution environment, item fragility and system evaluation procedures. Field studies have been completed on the Performance of bags from NFDM. A performance specification which will permit the development of alternative and possibly lower cost packages has been proposed. Basic work on the development of performance test methods continues with emphasis on the definition of failure modes as they relate to product-package combinations. Results indicate that different combinations require different test methods. This means that methods may have to be developed for each possible product-package combination.

REFERENCES:

A Critical Analysis of Vibration Measurement of the Transportation Environment, Hausch, JR, Michigan State University, School of Packaging, Tech Rpt 23, Sept. 1975

The Correlation of Shock with Free-Fall Drop Height Chatman, 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., 77

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: July 1979 START DATE: Aug. 1971 COMPLETION DATE: July 1999

ACKNOWLEDGMENT: Michigan State University, East Lansing (CRIS 0060632)

22 099639
SYSTEMS FOR MARKETING BEEF FROM SLAUGHTERHOUSE TO RETAIL FOOD STORE

Determine costs for various systems of marketing beef from slaughterhouse to retail food store and to develop improvements in these systems or develop a composite of two or more systems that would reduce marketing costs. Leadership will be provided by the Market Operations Research Laboratory. The objective will be met by detailed cost studies of 11 different systems for marketing beef. Cost data will be gathered from 16 firms including slaughterers, packers, central processors, and retail stores. Data gathered will include transportation methods and cost, labor cost and productivity, cutting losses, product shrinkage, description of methods, and other pertinent information. Most information will be based on company records with labor costs verified by time studies. Upon completion of data gathering,

an analysis will be made to determine the most efficient system. Following this, field tests will be implemented to verify findings as to the system that appears to hold the greatest potential for cost reduction.
A study was initiated to compare the costs of two systems for handling prefabricated cuts of beef between the wholesale chain warehouse and retail stores. One system utilizes wire baskets stacked on a four-wheel dolly; the other utilizes cardboard boxes on pallets.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute
INVESTIGATOR: Goulston, CL
SPONSORING AGENCY: Department of Agriculture, 1104-15864-005

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Aug. 1974 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041735)

22 138363
NEW AND IMPROVED SYSTEMS TO HANDLE PEANUTS AT COMMERCIAL STORAGES
Develop new or improved systems to handle peanuts as they are received, dried, stored, graded, shelled, bagged, and shipped. Presently used systems of handling peanuts will be evaluated for efficiency and cost. Where needed new or improved facility layouts, handling or flow processes, bagging and bulk handling, and sampling methods and equipment will be developed to reduce marketing cost and maintain quality as peanuts move through marketing channels. Peanuts in packages with a newer and stronger pouch material were flushed or vacuum-backflushed with nitrogen, CO(2) and air atmospheres. Atmosphere integrity successfully maintained in both quality and shipping tests. Packages shipped 1500 miles and stacking strength determined to be 4700 pounds with 1/2-inch deformation. Results indicate a 300% safety factor above anticipated requirements. Packages were ambient atmosphere stored and grade and germination determinations were made after 3, 6, and 12 months storage periods. Nitrogen and CO(2) backflush treatments gave less kernel skrinkage and highest SMK outturn. Moisture content was not significantly different. External damage was significantly higher in air flushed packages and refrigerated controls. Significant differences in bald and split kernels were less than allowable grade tolerances. Excellent sanitation and insect protection were achieved. Nitrogen backflush atmospheres maintained germination best but CO(2) atmosphere comparable through 6 months storage. Seed treated with fungicide before storage germinated slightly lower than non-treated seed.
REFERENCES:

Dimensional Changes in Peanut Pods, Kernels, and Hulls as Moisture is Removed During Curing, Slay, WO, J Amer Peanut Res and Educ Assoc., 1974

Damage to Peanuts from Free Fall Impact Slay, WO, J Amer Peanut Res and Educ Assoc., 1975

Some Interim Results on a New Way to Package Seed Peanuts, Slay, WO; Pearson, JL; Holaday, CE, Proceedings 32nd Ga. Crop Improvement Assn, Inc Annual Mtg, p 50, 1977

Package and Storage Effects on Peanuts Pearson, JL; Slay, WO; Holaday, CE, Proceedings 32nd Ga. Crop Improvement Assn, Inc Annual Mtg, p 50, 1977

Effects of Packaging Material, Atmosphere, Moisture, Temperature and Time on Peanut Food Quality and Germination, Pearson, JL; Slay, WO; Holaday, CE, Proceedings 32nd Ga. Crop Improvement Assn, Inc Annual Mtg, 9 (1977):63, 1977

PERFORMING AGENCY: Agricultural Research Service, National Peanut Research Laboratory, 7704-15700-007
INVESTIGATOR: Slay, WO
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Nov. 1974 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041935)

22 138365
TRANSPORTATION MODEL OF THE GRAIN AND FERTILIZER SECTOR OF NORTHWEST OHIO
Describe the present condition of the rural transportation system in selected areas of Ohio. Estimate probable grain and fertilizer flows, in selected areas of Ohio. Estimate the optimal flow of commodities between production and consumption points through the network. Trace the effects of alternative government transportation policies on the operation of the transportation system. Conduct cost- benefit analyses of alternative investments in the rural transportation system. Develop a transportation model to evaluate the impact of changes in the transportation system and government policy on the movement of agricultural commodities and future needs of the transport industry. The questionnaire for this project was finalized during spring quarter and data collection started in the summer quarter. Due to the detailed nature of the questionnaire, the number of completed, usable interviews (58) was less than desired but still adequate for the research. Data was obtained on number, size and location of grain elevators, monthly shipping pattern of corn, wheat and soybeans by transportation mode and by market destination for the 1974/1975 and 1975/76 crop years.
REFERENCES:

Rail Transportation Problems in Ohio Larson, DW, Ohio State University, Dept Agri Econ and Rural Soc, No. 577

The World Food Crisis: Implications for Trade and Aid Larson, DW, Ohio State University, Dept Agri Econ and Rural Soc

Recent Developments on Rail Reorganization in Ohio, Socio- Economic Information for Ohio Agri & Rural Communities, Larson, DW, No. 581, Nov. 1976

The Impact of Rail Reorganization on Grain Transfer Activities, Flow Patterns and Costs in Western Ohio, Kane, MD, MS Thesis, 1978

PERFORMING AGENCY: Ohio Agricultural R and D Center, Department of Agricultural Economics and Rural Sociology, OHO00534
INVESTIGATOR: Larson, DW
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1975 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0067954)

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. Curtain coating both sides of lettuce cartons with wax decreased the absorption of moisture by the cartons, the number of severely damaged cartons that arrived at eastern markets, and the amount of damaged lettuce, but it slightly increased the incidence of decay in the lettuce. Stone fruits: Shipments of fruit unitized and shipped on slip sheets or wooden pallets had about the same transit temperatures. Slip sheets resulted in slightly more damage to containers.
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: Feb. 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. Work has consisted mainly in developing a questionnaire to be used in obtaining information from feed grains and soybean firms. The contents of this schedule for S-115 is being coordinated with other regional projects in other regions of the U.S. Numerous changes and revisions have been necessary to accomplish the objectives of S-115 and cooperating agencies. Sampling procedures for the survey of grain handling and marketing firms are near completion. This survey of grain and soybean firms will furnish the basic data to accomplish several objectives of the regional project. Detailed information will be collected concerning the volume, origin, destination, mode of transportation, and storage facilities for each type of grain handled in the region. Additional data on type, number, and size of grain firms in the state and region will be developed. Markets to which feed grains and soybeans are shipped will be ascertained as well as the form in which the grains are marketed.

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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: July 1979 START DATE: July 1974 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0065175)

22 138481
RAIL WHEAT TRANSPORT EFFICIENCY STUDY

To enhance and improve the physical efficiency of the marketing/transportation distribution system for grains in the hard winter wheat belt moving to domestic or export points, recognizing and utilizing the inherent advantages of rail transportation. Physical distribution study of alternative marketing/-transportation systems.

PERFORMING AGENCY: Texas Transportation Institute
INVESTIGATOR: Bridges, S Tel (713) 845-5814
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Hardesty, F Tel (202) 426-2608 Boone, JW Tel (202) 426-0382

Contract DOT-FR-65104
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Apr. 1976 COMPLETION DATE: July 1980 TOTAL FUNDS: $630,000

ACKNOWLEDGMENT: FRA, TRAIS

22 153666
LASH AND OTHER INTERMODAL SERVICES IN THE PACIFIC NORTHWEST EXPORT DISTRIBUTION SYSTEM

Identify potential economies that could be obtained from movement of agricultural and forest products from the Pacific Northwest via the Columbia-Snake navigation system into overseas markets by recently innovated intermodal transportation systems such as LASH, standard intermodal containers and ocean-going barges. Identify products that would lend themselves to movement from the Pacific Northwest into foreign markets via the above transportations system and determine least cost routes and modes of moving these products. Characterize and compare efficiency and quality of service offered by existing and recently innovated transportation/cargo handling systems. Conduct studies of export potential of forest and agricultural products produced in the study region. Estimate least cost routes and modes with linear programming techniques. A least cost transshipment linear programming model was developed and run to evaluate the cost savings of shipping grass seed exports via container on barge on the Snake/Columbia Waterway. Modest savings were identified for this mode over traditional truck movements. A master's student surveyed the Pea and Lentil industry in the PNW to obtain rate data and other information for a least cost transportation study. At this time he is in the final stages of compiling data for the model. A recent decision by PFEL steamship line to convert its barge carrying vessels to full containerships has made it impossible to obtain rate data for LASH barge movements on the Snake/Columbia. However, the final fate of the barge-carrying vessel concept is still unresolved. While difficulties (particularly with steamship rate conferences and foreign port labor groups) have plagued LASH it still shows potential in the Pacific Rim trade.

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The Relationship Between International Trade and Transportation: Theory and Developments, Jones, JR, Nat Symp on Transp for Agriculture and Rural Amer, Paper, Nov. 1976

Commercial Navigation on the Snake/Columbia Waterway System: Issues and Prospects, Jones, JR; Casavant, KL, Idaho Economics, No. 2, Dec. 1977

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Commercial Navigation on the Snake/Columbia: Issues and Projects, Jones, JR; Casavant, K, Idaho Economics No. 2, Dec. 1977

The Relationship Between International Trade and Transportation: Theory and Developments, Jones, JR, Proc of Nat Symp Transp Agri and Rural America, New Orleans, DOT-TST-77-33, Aug. 1977

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics, CSRS IDA
INVESTIGATOR: Jones, JR
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, IDA00719

Contract 616-15-85
STATUS: Active NOTICE DATE: July 1979 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070665)

22 153674
EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage, and distribution system. Historical data on production and utilization of agricultural products and inputs will be projected to 1985 and 1990, as a means of developing spatial and temporal patterns of transportation. A time-staged transshipment model will be used to identify least cost organization of the agricultural industries and the effect of changes in transport requirements, as a basis for evaluating effects of alternative public and private decisions. Identification of the relationships between transportation rates and prices of grain requires complex economic and mathematical models. These models are being developed to quantify these relationships. Illinois is coordinating base data and projections of production and livestock consumption of feed grains. Grain production and consumption for Illinois has been estimated for 1985, 1990, and 2000, as a base for estimating transportation requirements.

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: July 1979 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. Projections have been made of the quantities of grain expected to move out of Iowa counties by 1985, 1990 and 2000. Work is continuing to project the tons of fertilizer that will be transported into each Iowa county.

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: July 1979 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. We have prepared estimates of production of grains by counties and have projected estimates to 1980, 1985, 1990, 1995 and 2000. Data have been submitted to the Illinois Station for incorporation in regional estimates. Similar estimates of livestock numbers, feed grain consumption and exportable grain surpluses by counties are being prepared. Compilation of state regulations of truckers have been carried out according to procedures established by the regional committee.

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: July 1979 START DATE: Oct. 1961 COMPLETION DATE: Sept. 1981

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. This project is currently not funded. A new research project has been submitted for 1978-79. Research progress basically consists of the following: Representation of the Research Station on NC-137 at regional meetings. Cooperation with North Central researchers on current plans for grain movement surveys in the Middlewest and river areas. Cooperation on planning future transportation research on rail movement, rate structure and current status of abandonment actions. Design of new research proposal to actively participate in the North Central research efforts.

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: July 1979 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. A survey of grain marketing and processing firms was conducted during 1978. The number of questionnaires taken was 128. The results from this survey are in the process of being edited, aggregated, expanded and checked against appropriate data in secondary sources. Almost all of the larger firms were successfully surveyed and a sample was taken of the smaller firms. The survey has provided the most accurate data on grain flows and facilities that we have ever had. The reason is that all the large grain handlers cooperated with our effort (except for one major grain company) for the first time. The only significant finding at this early date is that the West Tennessee area is both a major importer (about 816, 466 MT) and exporter of soybeans (421, 841 MT to New Orleans and nearly 353,802 MT to out-of-state crushers, mostly in Alabama). This fact is prima facia evidence of inefficiency in the marketing system of that area. The information of corn has not been summarized. The one rather startling first impression is that many, perhaps most, of our elevators are acting as though all of Tennessee is a surplus feed grain area rather than deficit; that is, the elevators tend to ship any feed grain receipts out-of-state to the south rather than store the grain for local use later in the marketing year. The feed mills appear to be doing the bulk of the importing of feed grains which is necessary to satisfy the deficit situation.

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: Feb. 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. Work consisted of making final plans for a survey of grain handlers. Plans are to coordinate the grain flow survey with NC 137 and NC 139 Regional Committee to obtain the data on almost a national basis. Projected grain production and utilization estimates are also being coordinated among regions. Analyses were continued from SM-42 and the first draft of a dissertation was completed analyzing the number, type, and size of grain firms needed for three areas of Mississippi under various assumed conditions.

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: July 1979 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. Work on this project during 1977 concerned mostly planning, since this was a new project last year. Three subcommittee meetings were held during the year to design and perfect a questionnaire which will be taken in the spring and summer of 1978. Work on the questionnaire was coordinated with two other Technical Committees in the U.S. and the U.S. Army Corps of Engineers in order to develop a questionnaire with common questions for the 48 contiguous United States. A draft is now ready. One subcommittee meeting also was held to develop common methodology among all 48 contiguous U.S. states for projecting feed grain and livestock numbers. In addition, work also continued in 1977 in supplying data for final publications under S-42, the project which this project replaces and overlaps.

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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: July 1979 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. Data have been assembled and projections made by sub-state areas for livestock production, grain production, and feed grain surplus or deficit by area for 1985, 1990, and the year 2000. A survey schedule has been developed in cooperation with other states participating in S-115 and NC-137 regional projects. This will be used in a 1978 survey of grain handling firms.

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: July 1979 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. Cost coefficients for on-farm drying and storage of grain were estimated using a case study of an incline auger facility with storage capacity of 8,812 quintals. Initial investment was $6.96 per quintal, with annual ownership costs of 87 cents and operating cost of 91 cents per quintal. Energy requirements were estimated for removing one percentage point of moisture from a quintal of rice at 0.53 KWH of electricity and 0.26 liters of fuel (L.P.). Estimates of the initial investment and processing costs are being assimilated for three size soybean processing plants.

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: July 1979 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. During the first year of this project, a grain flow and structure questionnaire was designed and tested. This instrument will identify the flow of grain from CRDs in Ohio to deficit regions and will document the importance of the southern and northeastern feed deficit markets and export outlets for Ohio's grain industry and farmers. To document the importance of the grain structure in Ohio and in the southern and Midwestern United States, to market performance, structure and performance variable summary tables were designed. To estimate Ohio's 1985, 1990 and 2000 feed and processing demands, a feed ration for all species of livestock was developed and livestock numbers for the years 1960-1975 were assembled. These livestock data are partially projected using trend analysis to 1985, 1990 and 2000.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO00596
INVESTIGATOR: Sharp, JW Baldwin, ED
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS OHO

STATUS: Active NOTICE DATE: July 1979 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 MAREKTING 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. A survey of elevators to determine grain flows by origin and destination, by mode of transport, is scheduled for summer of 1978. The questionnaire has been developed and the content coordinated with other regional committees. Cost data and coefficients have been developed for use in a national model relating policy and technological changes to number, size, and type of grain handling facilities.

REFERENCES:

Comparative Costs of Conditioning and Storing Corn Schwart, 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 Schwart, 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: July 1979 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. A survey of nearly 800 farmers was made to determine needs, wants and attitudes relative to grain marketing and farm input purchases. The results were analyzed and the findings made into a thesis and a bulletin. Attitudes toward present services, services for the future, cooperatives and refunds, and grain marketing techniques and services were tested. From the results analyzed here, those businesses who hope to serve farmers will know what influences farmers to come to their place of business or to have it. Then those firms can make adjustments not only to improve the profitability of their businesses, but to better serve present and future farmers. Another study and possible Master's Thesis is in process to test various marketing strategies by use of grain futures.

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: Feb. 1980 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073070)

22 179669
ADEQUACY AND COST EFFECTIVENESS OF BULK COMMODITY TRANSPORTATION SYSTEMS

Determine the adequacy of the transportation system for out-bound shipments of grains, soybeans and soybean products and for obtaining and distributing agricultural inputs such as fertilizer and fuel. Investigate potential shifts in marketing patterns or sources of production inputs due to changes in transportation costs, government regulations and transportation facilities, terminals and ports. Recommend appropriate policy and investment changes from the private and public sectors. Determine by county the quantities of bulk commodities to be transported in 1980 and 1985. Determine by commodity seasonal transportation and storage requirements. Determine existing on and off-farm storage capacity. Identify bottlenecks in the transportation system via a series of model solutions or simulations representing different levels of commodity movements and transportation capacity. Develop policy and investment recommendations. The first commodities to be considered will be corn, soybeans and soybean products. Wheat and other small grains, fertilizers and fuels will be considered subsequently. Key logistical factors will be investigated and assessed. Barge movement on the Upper Mississippi was compiled by pool by commodity. Estimates of barge movement by individual commodities in 1985 were made. Barge shipments of farm products are projected to be 91% over 1975 and all barge shipments up 59%. These volume projections based on quantity and location of primary commodities are much higher than Lock and Dam 26 studies based on GNP and demographic trends. Lock capacity on the Upper Mississippi will be adequate past 1985 unless western coal shipments are much greater than forecast. Lock congestion in urban areas may become a problem due to increased recreational craft lockages. Barge costs on Upper Mississippi will increase due to empty backhauls as

northbound coal movement declines but barges will retain cost advantage over rail for grain. Coal movements in Upper Midwest were analyzed. Most barged western coal is consumed in Minnesota, Wisconsin, Iowa and does not move along distances by water. Costs for transferring coal from rail to barge or truck were synthesized. New electric plants in the Upper Midwest will get western coal direct by unit train. Transfer costs make short water movements uneconomical. Analysis of grain flows by transportation modes out of Upper Midwest indicates continuing shifts to truck/water movement. A least cost transportation model for soybeans is under development. Modal flows of fertilizer and other inputs are being analyzed.

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-045
INVESTIGATOR: Dahl, RP Easter, KW Fruin, JE
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MIN

Contract 701-15-37
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Apr. 1977 COMPLETION DATE: Oct. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0075095)

22 179670
ECONOMIC FACTORS AFFECTING NORTHEAST MARKETS FOR LOCAL FRUITS AND VEGETABLES

Determine the economic impact of changing energy utilization patterns on the Northeast fruit and vegetable industry. The distribution of Maine potatoes will be analyzed to quantify the effect of current and alternative marketing patterns on energy utilization. Initially the current product flow to various points in the Northeast will be determined. Also, a representative energy input per unit for highway and rail transport will be developed through a mathematical programming approach the cost of distribution-energy utilization tradeoff will be determined for alternative marketing patterns. This project is a new regional research project which was begun in January 1978. In the past 9 months work has been concentrated on objective 1 describing and examining the components of the Maine potato marketing system. The following have been accomplished: 1. Potato Marketing Trends: The marketing area for Maine tablestock potatoes has been analyzed for trends utilizing destination of shipments. Shipments by both aggregated regions and by state were examined using the past 15 years data. There has been a significant downward trend in the quantities being shipped to all regions of the country except the southeast. Considering the percentage of total shipments going to given regions, one finds significant downward trends for midwest and far west, a significant increase for the southeast, and no definite trend for the northeast. In general, Maine's markets for fresh potatotes are declining. 2. Marketing Characteristics: An analysis of domestic shipments has been made. During the past 8 marketing seasons, the Russet Burbank has decreased from about 10% to 6% of the total shipments, with a possible trend in sizing toward 12 ounce rather than 16 ounce maximum. In the same period, there appears to be a slight increase in the seasonal average of grade defects in potatoes being marketed. Percent grade defect also tends to increase as the season progresses. Size of the potatoes marketed, container size and type, and portion washed all remained relatively constant.

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: Feb. 1980 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074775)

22 179674
GUIDELINES FOR RURAL AND COMMUNITY DEVELOPMENT IN ECONOMIC REGIONS OF MINNESOTA

Describe the interrelationships among the various sectors of the regional economics in western and southwestern Minnesota's agricultural economies. Develop an understanding of the changes that have taken place in these economies and predict the impact on the regions' incomes and employment of changes that may occur as a result of policy decisions on resource use. Input-output, linear programming and simulation models will be used to describe flows or transactions among sectors, multipliers coefficients and the systems. Both primary and secondary data sources will be used. The computer work for the input-output model is now completed. A paper explaining the methods, the results and how to use the model has been written and will be published as a technical bulletin. This input-output analysis, along with the shift-share analysis, has provided the Region 6E commission an excellent picture of its economy and how it might change in the future. The analysis of people transportation in Meeker County found that school buses or volunteer drivers were the least expensive means to provide transportation for the rural elderly. The results of this pilot study have been widely used in Minnesota both to generate interest in rural people transportation and for planning new rural transportation systems. A benefit-cost analysis of the rehabilitation of a rail branch line showed that the total cost savings to the private sector are sufficient to make it feasible for private shippers to participate in rehabilitation. However, benefits do not accrue uniformly to shippers. It is therefore difficult to get enough shippers to participate. A study of the effects of waterway user charges on the four-county Title V area found that transportation patterns would not change substantially at the level of user charges proposed although shipping costs to the region increased. The principal effort of the Title V Land Use project is the development of Region 6W Natural Resource Data Base.
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Transportation for Older Rural Americans Easter, KW; Jensen, HR, UMN-Dept of Agricultural and Applied Economics, Staff Paper P 77-22, 18 p., Oct. 1977

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Title V Pilot Projection in Minnesota: Transportation and Land Use Planning in Rural Regional Development, Easter, KW; Jensen, HR, University of Minnesota, Final Report, 42 p., 1977

On the Financing of Rural Roads. Fruin, JE, UMN-Dept of Agricultural and Applied Economics, Title V Report 20, 12 p., 1977

Issues in Rural Road Management Fruin, JE, 1977

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-084
INVESTIGATOR: Easter, KW Jensen, HR
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS MIN

STATUS: Active NOTICE DATE: July 1979 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0064438)

22 179676
BIOLOGICAL AND ENVIRONMENTAL STORAGE AND TRANSPORTATION PARAMETERS THAT AFFECT GRAIN MARKETABILITY

Determine losses due to insect and microbial activity throughout the grain marketing system. Make economic analyses of physical losses, reduction in quality, and increased storage and transportation costs occurring in storage and transit as a result of identified biological activity. Reduce damage and contamination by these pests by developing control measures (chemical pesticides and generated low oxygen atmospheres). Estimate costs of control measures. Identify pest populations (insects and microbial) by monitoring commodities in transit from farm to export and by examining selected sublot 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. An identity preserved lot (1360 metric tons) of wheat was followed from receipt at harvest through storage and transfer at the country elevator, inland terminal and port terminal. Grain samples taken after each transfer were analyzed for biological activity, grade factors and milling and baking characteristics. No insect were detected on receipt of the wheat at harvest, but several species were present after 4 months storage when the wheat was transferred from the country elevator to an inland terminal. Fumigation prior to load out at the country elevator and again prior to load out at the inland terminal failed to completely disinfest the wheat. Initial population of field fungi in the wheat gradually disappeared during the 10 month period from harvest to export. There was no significant growth of storage molds in the wheat. Preliminary data from an elevator survey of biological activity in wheat and corn exports indicates

Sitophilus and Cryptolestes species are the predominate insects present. Samples containing one or more live insects following incubation ranged from 15 to 25% at Great Lakes, East Coast, and Gulf Coast export elevators to less than 10% among West Coast elevators. Corn samples had an average of 30% of the kernels internally invaded by Aspergillus glancus and 2% by A. flavus; most wheat samples had 0 to 5% invasion by A. glancus and other storage fungi.

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

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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: July 1979 START DATE: June 1976 COMPLETION DATE: Nov. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043120)

22 179677

INFORMATION FOR ORDERLY CHANGE IN THE FEED AND GRAIN INDUSTRY

Develop an efficient grain marketing structure for small area of Indiana that can be applied state wide. Evaluate effects of DOT railway abandonment on grain terminals location and elevator structure. Analyze information on number, size, and condition of grain and feed facilities. Develop critera for efficient structure and flow pattern for industry. Evaluate number and location of subterminals by computer program. The computer program used to evaluate the various marketing alternatives to farmers for corn and soybeans has been tested. With slight modifications, the program is operational on a stand-alone basis on the FACTS computers located in the offices of Indiana's County Extension Agents. The program evaluates marketing alternatives, including hedging, storage without hedging, selling grain wet, on-farm and commercial drying and storage and deferred pricing. Data from the financial statements for over 900 Indiana elevators has been coded and key punched on computer cards. An analysis of the factors that influence profitability by size of business is being conducted.

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND045040

INVESTIGATOR: Uhrig, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IND

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1969 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0032426)

22 179682

TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS

To inventory the capacity of plants transloading grain and dry bulk fertilizer and the rail and barge facilities serving them at deepwater ports on the Mississippi River, identify bottlenecks in this intermodal configuration and obtain data on investment costs for expansion of various components of these facilities, project the configuration of transportation and plants needed to handle the volume of grain and dry bulk fertilizer expected to move through this configuration by 1985 and added investments required for it. Data on current capacity and the cost of expanding its various components will be obtained from a survey of personnel of all grain elevators, fertilizers, and railroad companies operating at deepwater ports on the Mississippi River. Appropriate sampling of records and other procedures may be used in developing some of the details needed however. Working closely with Iowa State University in a concurrent study these data will be used to develop a time staged transshipment model to estimate optimal grain, fertilizer, and transportation facilities needed in deepwater ports on the Mississippi River to handle the business projected for 1985. In this tri-university study, LSU was assigned responsibility for analyzing grain movement within the Mississippi River Gulf Port elevator configuration. To that end, a simulation model of export elevators, barges, rail units, trucks, and ships has been constructed using the Fortran based GASP simulation language. The basic forms of the statistical distributions and the estimates of their parameters for interarrival and service times have been established by equating sample and population moments. Relative service time performance measures were also developed among the export elevators. Data gathering and compilation as well as coefficient refinement are constant and continuing efforts. Model acceptance efforts will commence in early 1979. These efforts will consist of model output presentations and reconciliations against the records and experience of elevator managers. Model experimentation to analyze the ability of the configuration to handle projected 1985 volumes and other scenarios of interest will follow validation efforts. A final report is planned to coincide with the termination data.

See also RRIS 22A 179683 and 20A 179671.

PERFORMING AGENCY: Louisiana State University, Baton Rouge, Department of Agricultural Economics and Agribusiness, LAB01824

INVESTIGATOR: Traylor, HD Gauthier, W

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS LAB

Contract 616-15-87

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070539)

22 179683

TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS

Project quantities of grain and dry fertilizer to move through deepwater ports on the Mississippi River by 1980. Estimate structural adjustments needed in receiving, loadout and storage facilities to minimize cost of handling and transporting projected quantities at deepwater Mississippi Rivers ports. Estimate structural adjustments required in rail facilities at deepwater Mississippi River ports. Modify existing models, collect data and project 1980 quantities. Modify transshipment model and port simulation models, collect data and estimate required structural adjustments in grain and fertilizer facilities, and in railroad facilities at deepwater Mississippi River ports. Data have been collected by crop reporting Districts on 1985 corn, soybean, and wheat production and the amount of corn and wheat fed to livestock. The remainder is assumed available for movement to domestic processors and to export ports. Data have been collected on the expected 1985 quantities of corn, wheat, and soybeans to be processed at individual processor locations. Data have been collected on existing Ex Parte 357 rail rates from each crop reporting district to corn, wheat, and soybean processing locations and to major export ports. Published barge rates have been collected from the Merchant Exchange of St. Louis. Truck rates have been estimated from each crop reporting district to relevant markets. The first computer solution should be available in April 1979 with completion of the project expected by September, 1979.

See also RRIS 22A 179682 and 20A 179671.

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

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ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070487)

22 179684

PLANNING RURAL TRANSPORTATION SYSTEMS

Identify basic rural transportation market characteristics related to production and demand of transport services for the grain and soybean, fertilizer, feed and rural manufacturing and retail industries. Analyze sensitivity of grain, fertilizer and feed flows and shipper choice of mode, to transportation price adjustments in Oklahoma. Construct and demonstrate strategies by which individual, agricultural and rural manufacturing and retail users of rail services can adjust to local rail line abandonments or service discontinuances; and construct and demonstrate a procedure for evaluating public and

private group investments in rural road and railroad branch line facilities, in an intermodal context, for application to small regions. Market characteristics are determined by surveys, econometric analysis and investment analysis. C-D. Individual firm and regional planning models will be approached with mathematical programming techniques. Drafts of reports have been prepared on the following: 1) estimation of an annual cost function for operating tractor-trailer units in carriage of wheat and livestock, 2) results of a survey of Oklahoma manufacturers located in rural counties indicating dependence of rural industry groups upon railroad services, 3) a description of the railroad facilities and services, in Oklahoma including a financial analysis of each Class I railroad serving the state. 4) the existing railroad and truck rate structure for wheat moving from Oklahoma origins and 5) effects of seasonal railroad rates on wheat movements from Oklahoma. A computerized information and analysis system is operable with capabilities to measure railroad deficit on branch line operations and benefits or rail preservation projects.

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Railroad Dependence of Rural Manufacturing Industries in Oklahoma, Johnson, MA; Gerloff, D, Oklahoma Current Farm Economics, Vol. 50, Dec. 1977

Effects of Seasonal Railroad Rates for Wheat Upon Wheat Storage and Transportation Markets in Oklahoma, Shouse, JC, Oklahoma State University, M.S. Thesis, 135 p., 1977

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01603
INVESTIGATOR: Johnson, MA
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS OKL

STATUS: Active NOTICE DATE: July 1979 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068185)

22 179686
ALTERNATIVE RAIL RATES IN THE CORN SOYBEAN MARKETING SYSTEM

Evaluate alternative demand-sensitive rail rates on the corn, soybean marketing system. Compare impact of demand-sensitive rail rates with contract, annual volume and other types of rail rates on shippers, receivers and carriers. Collect data on monthly distribution of grain receipts, shipments, mode of transport, and destinations. Compare impact of alternative demand-sensitive rail rates with other types of rail rates on timing and mode of shipment, producer, and shipper income, and on carrier car requirements. 1. A survey of elevators in 2 multi-county areas of Iowa has been completed. The purpose of this survey was to collect the following historical data for the 1977 crop year. a) Monthly distribution of corn and soybean receipts from grain producers. b) Monthly distribution of corn and soybean shipments from elevators to final destinations. c) The final destinations of these shipments. d) The mode and size of transport. 3) Elevator storage and receiving capacities. f) Truck rates paid for truck shipments. 2. Collected daily nearby futures prices for corn and soybeans for the period September 1976 to September 1978. 3. Collected daily cash prices for corn and soybeans at the relevant domestic and export markets for the period from September 1976 to September 1978. 4. Collected 1978 barge rates for contract and spot market barge movements from the Merchants Exchange in St. Louis. 5. Collected Ex Parte 357 seasonal and non-seasonal rail rates for various sizes of shipments from each elevator in the 2 multi-county areas to relevant processing and export markets. 6. Collected submissions of grain companies and grain exchanges to court suits filed by grain shippers opposing demand-sensitive rail rates filed by railroad companies to obtain information on why grain companies object to seasonal rates and to obtain their suggestions for alternative rates.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, IOW02226
INVESTIGATOR: Baumel, CP
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IOW

Contract 701-15-36
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ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073201)

22 179690
INCREASING EFFICIENCY IN THE GRAIN HANDLING, STORAGE AND TRANSPORTATION SYSTEM SERVING THE SOUTH PLAINS

Develop a detailed description of spatial and temporal grain flows and alternative mode freight rates. Determine least-cost grain distribution patterns and most efficient mode use for described grain flow. Estimate least-cost number, size and location of country elevators and feed mills to serve cattle feeding industry. Develop an interregional competition model of feed grain sector with emphasis on South Plains. Via personal interview and mail questionnaires of grain handlers, transportation companies and truck brokers existing grain flows and utilized mode freight rates estimated. These data entered into a spatial model to resolve least-cost distribution patterns and modes and then contrasted with actual distribution and utilized modes. Grain elevator, feed mill and transport cost functions and feed grain production data estimated and entered into model to optimize industry organization serving area cattle feeding industry. Spatial analysis of feed grain sector accomplished by estimation of regional demand and supply functions and transport costs which are data inputs for spatial equilibrium model. Often models of the rural freight transportation system are extremely large and efficiency of computer solution procedures becomes a significant consideration. A network flow and linear programming code were compared for the solution of network structured models representative of rural freight transportation systems. Comparative analysis was carried out on a model representing a wheat marketing/transportation system involving grain flows from farms through country elevators and inland terminals to Gulf port destinations. The comparative analysis revealed the network flow algorithm to be 46-48 times faster than the linear programming code. An additional attractive feature of network models is their ability to attain a global minimum when a convex relationship is included. Network flow models are superior research tools to analyze rural transportation systems if the problem does not include concave costs or require preservation of more than one commodity's identity throughout the system.

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Optimizing Subindustry Marketing Organizations: A Network Analysis Approach, Fuller, S; Randolph, P; Klingman, D, American Journal of Agricultural Economics, Volume 58 No. 3, Aug. 1976

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An Interzonal Trade Flow Model for the Texas Feed Grain Industry, Knudson, B, MS Thesis, Dec. 1976

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Texas Wheat Flows and Modes Fuller, SW; Paggi, M; Engler, D, Texas Agricultural Experiment Station, B-1180, 1977

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics, TEX06087
INVESTIGATOR: Fuller, SW
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS TEX

STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Mar. 1975 COMPLETION DATE: Mar. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0067558)

22 179693
ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export market techniques and strategies with respect to the logistics and costs of marketing and transportation. Evaluate alternative inventory and export policies with respect to price stability and producer and consumer utility. Grain movement information will be collected from the railroad companies and the Statistical Reporting Service, U.S.D.A. Also the transportation costs of shipping grain by rail and truck-barge will be estimated. With these basic data, existing transportation models will be developed to identify least cost routings for wheat and barley from various origins in Montana to port facilities on the West Coast. The specific procedures include using historical data to estimate and project demand and supply imbalances in world grain trade, calculating the variability in supply and demand and surplus and deficits under alternative assumptions of world production and consumption; and developing models that will show the affect of alternative inventory policies on the size and variability of world

grain surplus or deficits. 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

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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 differentials, the logistics and costs of marketing and transportation, market share and market power in world grain trade and economic incentives to producing and marketing firms. To evaluate alternative inventory and export policies with respect to: Marketing efficiency, price stability, producer and consumer utility, their effect on private and state trading systems, servicing the export markets and the effects of export embargoes on prices and market share. Information theory, models of demands and prices of product characteristics, grain users' attitudes toward product characteristics and grain samples will be used to study grades. Private and public grain prices and utilization will be estimated from information provided by recent studies on storage costs and demand characteristics. Econometric models of international production, consumption and trade will be constructed. Mathematical programming and queuing models will be used to study grain routing. To improve forecasts of U.S. grain production, supply equations are being developed in which farmers' intentions to plant and expected yields are combined with measures of market conditions and measures of price support programs. Import time series for 16 major importers were analyzed. The net import volume of wheat for 1962 through 1975 for each country was regressed on domestic supply of wheat or other domestic substitute energy foods. Extremely complete association was found for Japan, India, Iran, U.K., and South Korea indicating that these countries import wheat to offset domestic supply variation which is due mostly to weather variability. Relatively poor explanations for the variation in imports were obtained in West Germany, Poland, Pakistan, USSR, and Brazil. Work was initiated to estimate import demand equations for U.S. corn and to investigate elements in the U.S. market which can influence foreign imports of U.S. corn. The model has been formulated and some data has been collected. The model has imports of U.S. corn as a function of the domestic price of corn, domestic per capita income, domestic livestock inventory, domestic price of wheat, amount of corn shipped as food aid to the importing country, domestic price of corn in the importing country, and the exchange rate. The amount of corn shipped as food and to the importing country also influences the domestic price of corn. Study of relation between U.S. corn grades and feeding quality of corn is underway.

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

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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. Nebraska is evaluating the proposed change in U.S. grade markets. The investigation is divided into two parts; corn from farm storage, and new crop corn. Collection of data for farm stored corn has been completed. Corn samples were collected from 20 country elevators and five terminal elevators. Ten incoming loads and 10 cut going shipments were sampled at each elevator. Samples were subdivided into seven particle sizes with a Carter dockage machine. The sub-samples were weighed. Test weight and percent moisture were determined. A chemical analysis and microscopic evaluation was done by sub sample. Microscopic evaluation included a determination of inert material, weed seeds, insect parts, and corn material. Samples for new crop 1977 corn have been collected from country elevators. Collection of samples from terminal elevators is in process.

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

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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 to producing and marketing firms. Evaluate alternative inventory and export policies with respect to: Price stability, producer and consumer utility, prices and market share. Project demand and supply imbalance in world grain trade. Develop models to measure the effect of inventory and trade policies on variability of world and U.S. grain surplus or deficit, trade patterns, and economic incentives at the producer level. Use existing spatial equilibrium models to identify least cost routings from origin to port. Part I. An effort was made to obtain a complete list of all port elevators, barge loading facilities, and unit train facilities in the U.S. For these facilities and for all soybean processing plants, capacity, location and ownership were compiled and are now being published. For the 66 port facilities 251 inner barge facilities and 241 unit train facilities, market value estimates are $3.3 billion. Replacement value is almost double this figure. These facilities were specifically designed to handle large quantities of grain exports. The report is not all inclusive of firms engaging originating grain exports but does give those who are specialized to do so. Part II. For the

soybean, soymeal, and soyoil markets, import demand functions for the EEC-9 countries, Japan, Spain, Mexico, and Canada have been estimated. These countries account for at least 3/4 of the U.S. exports of these commodities during the past 15 years. Product price, substitute product price, and livestock production or personal income are the major determinants of quantity demanded. Excess supply functions for U.S. have been estimated using estimated domestic supply functions and published domestic demand elasticities. The elasticities of the excess supply functions are very elastic.

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Grain Facilities in the U.S. Specializing in Originating Grain for Export and Soybean Processing Plants, Sharp, JW, OSU, Department of Agricultural 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: July 1979 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. A network transportation model has been developed using the Cut-of-Kilter algorithm. This model will be used in a multi-mode and multi-region network transportation analysis by crop reporting districts for hard red winter wheat. Work completed to date includes data collections on (a) historical winter wheat production, by county, in Texas, Oklahoma, Missouri, Kansas, Nebraska, Wyoming, Colorado, and New Mexico; (b) intracounty domestic Demands (flour millers, feed mills, feedlots, etc.); (c) harvesting periods and temporal shipments of wheat; (d) location, licensed capacity, available transportation services, and grain receipts for each of the country elevators, inland terminals, and port terminals; (e) on-farm storage capacity (estimated) and costs; (f) transportation modal capacities; (g) trucking cost coefficients; (h) rail costs and rail rates; (i) barge differentials; (j) distance matrices for highway, railway, and waterway. Research identified as the North Central and Southern Regional (NCSR) Grain Flow Study was undertaken. Survey data was gathered, edited, and summarized for this study.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01662
INVESTIGATOR: Oehrtman, RL
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

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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. The influence of balance of payments considerations in affecting importing decisions for the centrally planned economies was analyzed. The principal investigator withdrew from contributing a chapter in the grain marketing book and is concentrating instead upon collaborating with Schmidt (Illinois), Schoonover (USDA), and Bob Jones (Purdue), on research dealing with East-West trade issues and compiling and editing that work into a publication. Mrs. Paciencia Manuel in the meantime has begun to develop a dissertation with her topic concerning the world grain trade and ocean shipping. Ocean freight rates are being compiled as inputs into this study.

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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

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ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071187)

22 179699
ECONOMIC EFFECTS ON AGRICULTURE OF THE NORTHEASTERN RAILROAD SYSTEM

Determine rail tariff rates and associated service charges levied on agricultural transportation activities in New England under plans to reorganize the Northeastern railroad system; determine financial stability and profitability of regional agri-business and farms under projected rail service cost functions; identify, describe, and quantify economic response and potential structural shifts within the agricultural industries of the region; simulate aggregate farm production levels resulting from projected changes in input prices. Synthesize rail service cost functions from reorganizational guidelines using cost budgeting techniques. Secondary data and sampling surveys will be used to identify production coefficients of farms. Linear programming techniques will simulate microeconomic response of agri-firms to adjustments in transportation costs. Aggregated response parameters will be used to identify structural and production shifts. Over 500 egg farms in New England were surveyed to obtain information on production techniques employed, layer capacity, and history of farm size over the past twelve years. This information was used with egg industry economies of scale studies to delineate and construct five representative egg farms. This selection of representative farms was based primarily on differences in production technology employed and farm layer capacity. Net profit levels were then evaluated for each representative farm holding constant product price, technical coefficients of production, and factor prices not affected by rail transportation. Various levels of increase in feed cost were then budgeted into each model farm and the effect on profit level and the ability to accumulate capital noted. The individual histories of farm size over time obtained in the farm survey were then used to develop a stationary Markov chain analysis of the structure of the New England egg industry for the period 1967-78. The Markov technique is used to assess any structural change in the industry, in particular that was caused by an increase in feed cost. Preliminary results indicate good predictions of the number of farms in each size class. The analysis shows a dramatic increase in the probability of exits of farms from the two small classes during the period of high feed prices from 1973-75. Finally the number of farms in each representative farm class are then projected and used as weights to determine annual aggregate egg output.

REFERENCES:

Recent Developments in Feed Transportation to New England Seaver, SK; Hanekamp, WJ, U Conn, Agricultural Experiment Station, Research Rpt. No. 48, 1977

PERFORMING AGENCY: Connecticut University, Storrs, Department of Agricultural Economics and Rural Sociology, CONS00475
INVESTIGATOR: Seaver, SK Lee, T Hanekamp, WJ
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS CONS

Contract 616-15-84
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Apr. 1976 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-007664)

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. In addition to the information gathered through literature searches and interviews with industry representatives on equipment, practices, and procedure to properly clean and sanitize meat trailers, results of studies on the use of several types of detergents in automatic high pressure cleaning equipment have been obtained. These research results as well as the information on types of mechanical and automatic cleaning equipment, types of chemical cleaning and sanitizing compounds, cleaning practices and procedures, trailer design, and other factors are being incorporated in a manual for distribution to the meat and transportation industries. Additional studies to identify the type of debris and contamination found in meat hauling equipment after it is used for a variety of backhauls have been planned to determine effective cleaning and sanitizing programs.

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: June 1979 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.

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: June 1979 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1983

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0044430)

22 196117
IMPROVING MARKET STRUCTURES FOR HORTICULTURAL CROPS

Improvement of physical and economic efficiency in the marketing system for horticultural products for development of alternate marketing strategies that serve to enhance the competitive position of growers and processors throughout the industry. Problems will be identified and procedures for evaluation established. Linear programming techniques will be used to supplement empirical and case study analyses. Regional trade advantage under alternative marketing strategies will be evaluated through use of linear programming techniques. Programs centering upon direct farm marketing were expanded through a USDA grant under the Farmer-to-Consumer Direct Marketing Act of 1976. Objectives under the program center upon improving the market position of growers through increased farm to consumer direct sales. Growers groups have been organized. Direct marketing assistance programs have been initiated. Prototype farmers market facilities are in the planning and development stages. Consumer education programs have been developed and implemented. Program benefits are currently being generated. Farm receipts from direct fruit and vegetable sales in Indiana have increased from $4 million in 1970 to $12 million in 1978. Findings indicate potential direct market receipts of $35 million by 1985. Programs in regional trade advantage in processed fruits and vegetables have continued. The impact of aseptic bulk processing/transport/decentralized packaging have positively impacted the domestic market structure. Increased economic efficiency benefits have increased the market portion of domestic producers and processors relative to foreign suppliers. Aseptic bulk commodity shipping in railcars was adapted by industry in 1978 through development of the Asepticar. Productive planning and feasibility studies continued to provide growers and processors in the fruit and vegetable industry with current decision-making information.

REFERENCES:

Onions: Production Marketing and Economic Trends Sullivan, GH, Purdue Res. Bulletin 948, 1977

Fresh Market Tomatoes: Production Trends and Industry Organization, Sullivan, GH, Purdue Res. Bulletin 945, 1977

Tomatoes for Processing: Production and Economic Trends Sullivan, GH, Purdue Res. Bulletin 947, 1977

Potatoes: Industry Trends and Outlook for Future Production Planning, Sullivan, GH, Purdue Res. Bulletin 949, 1977

Floral Trade Policy: Procrastination, Protection and Public Perspective, Sullivan, GH, Florists Review, 1977

PERFORMING AGENCY: Purdue University, Department of Horticulture, IND065026
INVESTIGATOR: Sullivan, GH
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS IND

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: July 1969 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0032432)

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, M
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, CSRS TEX

Contract 801-15-40
STATUS: Active NOTICE DATE: July 1979 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: July 1979 START DATE: May 1978 COMPLETION DATE: May 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0076330)

22 196121
NEW AND IMPROVED TECHNOLOGY IN HANDLING AND TRANSPORT OF FRESH FRUIT
Determination of needs for new and improved techniques, methods of multiple handling, and equipment that will reduce costs and product losses of fresh fruits. Evaluate current assembly, packaging, handling, and transport procedures (truck, rail, and air). Determine comparative handling efficiency by time studies and direct observations, obtain measures of product damage and physical loss, and determine significant problem areas. Evaluation of current handling procedures, indicate differences in the level and degree of physical injury between kinds of packinghouses and stations within a packinghouse. Data accumulation is proceeding, and layouts of all plants to be studied are being prepared. Two kinds of 50 x 30 cm containers for apples and pears are undergoing testing. Preliminary estimates indicate that labor and packaging material costs could be as much as 20 cents per box less for these new containers than for conventional tray-packs. Preliminary testing also indicates less bruising injuries during distribution in the new containers.
REFERENCES:
Metric Box for Apple Packing, Palletizing, and Transport Hovey, Rm; Fountain, JB, ASAE Tech Paper No. 786022, June 1978

PERFORMING AGENCY: Agricultural Research Service, Processing, Harvesting and Handling of Tree Fruits Division, 5803-20580-007
INVESTIGATOR: Fountain, JB Hovey, RM
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0044699)

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. The causes of the equipment shortage will be reviewed and analyzed with a focus on institutional incentives and alternatives designed to alter the institutional constraints will be analyzed utilizing a microeconomic approach. The outcome of line swaps, sales and mergers between the various railroads will be simulated using a linear programming model to determine the impact upon South Dakota grain producers. And lastly the monetary cost and benefits of railroad abandonment imposed upon individual shippers and producers will be explored and adjustment strategies will be evaluated.

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: July 1979 START DATE: Nov. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0077403)

22 303268
GRAIN COMMODITY FLOW STUDY FOR CALENDAR YEAR 1977
OBJECTIVE: Compile grain flow information for calendar year 1977 for all grain, originating in Kansas, entering commercial channels. Develop origin-destination grain volumes for sub-state areas by mode of transportation. APPROACH: Field survey of inland elevators, corn, millers, flour millers and soybean processors.

PERFORMING AGENCY: Kansas State University, Agricultural Experiment Station
INVESTIGATOR: Sorenson, LO
SPONSORING AGENCY: Kansas State Government, 0076655 KAN-05-659

STATUS: Active NOTICE DATE: Dec. 1979 START DATE: Apr. 1978 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GY 76655)

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

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: Delousy, C Tel 202-426-0966

STATUS: Active NOTICE DATE: Aug. 1979 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 156668
LIGHT RAIL TECHNOLOGY
A study of the possible use of Light Rail in Nassau County: A Demonstration Project.
REFERENCES:
Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation
INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF
SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation
RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977

ACKNOWLEDGMENT: New York State Legislature

23 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 tne 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 177691
PERSONAL TRANSPORTATION MODES--AN ASSESSMENT OF USE, CHOICE, AND FUTURE PREFERENCES
The objectives of the study are to: (1) evaluate the present and expected future individual preferences towards the automobile and other modes of transportation, (2) identify the factors that influence choice as reflected by current ownership or alternatives to ownership, and (3) identify use patterns of the automobile and other modes of transportation. The results of this study will provide a better understanding of the factors that now influence public preferences for the automobile and alternative modes of transportation, and an assessment of how those factors might operate under future social and economic conditions. The results also will contribute to a comprehensive assessment of automobile transportation being carried out by the Office of Technology Assessment (OTA) of the U.S. Congress. The objective of the OTA program is to assess the social, environmental, and economic impacts of prospective changes in the characteristics and use of the automobile. The study will be national in scope and consist of six major tasks. The first two tasks concern choice and use characteristics of automobile and will be accomplished using existing data sources. The next two tasks address current preferences and future choices regarding the automobile and other modes under certain conditions and will involve survey research to acquire data representative of various groups of individuals in the nation. The fifth task will be an assessment of future use patterns, and the sixth will be a synthesis of future alternatives and will serve as the integrating activity for the entire study.

PERFORMING AGENCY: Cambridge Systematics, Incorporated
INVESTIGATOR: Sherman, L
SPONSORING AGENCY: National Science Foundation, ERS77-06108

Grant
STATUS: Completed NOTICE DATE: Feb. 1980 START DATE: June 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: $243,072

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CT 445)

23 178058
STUDY OF TRANSFER POLICIES AS THEY AFFECT PERFORMANCE OF AND DEMAND FOR PUBLIC TRANSPORTATION
CRA is reviewing transfer policies as they are currently practiced on transit systems nationally and is preparing a summary of current practice and of the issues relevant to improved transfer policies. Guidelines will be provided for local transit agencies on improved transit transfers and recommendations will be produced for UMTA on the planning of new demonstrations of transit transfers.
REFERENCES:
Study Design: Transfer Policies and Cost Charles River Associates; Prepared for TSC, Mar. 1978

PERFORMING AGENCY: Charles River Associates, Incorporated, 388.02
INVESTIGATOR: Brand, D Tel (617) 266-0500 Nelson, M
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Casey, R Tel (617) 494-2000

Contract DOT-TSC-1406
STATUS: Active NOTICE DATE: Feb. 1980 START DATE: Oct. 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: $97,500

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. 1979 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1981 TOTAL FUNDS: $298,613

ACKNOWLEDGMENT: American Public Transit Association

23 185243
GUIDELINES FOR PREDICTION OF TRANSIT SYSTEM IMPACTS FOR ALTERNATIVES ANALYSIS
The purpose of this project is to offer technical guidelines in the preparation of alternatives analyses for high capital transit projects. Issues to be considered include important measures of impacts: system patronage, economic development, energy, environmental, aesthetic, social institutional, safety and security. It will also analyze community participation and impact evaluation formats.

PERFORMING AGENCY: Charles River Associates, Incorporated, 422
INVESTIGATOR: Dunbar, F Tel (617) 266-0500 Winston, B
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Spear, B Tel (617) 494-2276

Contract DOT-TSC-1572
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Aug. 1978 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: $139,077

ACKNOWLEDGMENT: Charles River Associates, Incorporated

23 185244
METHODS FOR IDENTIFICATION OF TRANSPORTATION ALTERNATIVES
Development of methods for identifying comprehensive set of alternatives to high capital transit investments for use by cities carrying out Alternatives Analyses (AA) for UMTA. The basic objective is to generate alternatives which are responsive to local and national goals while ensuring that a range of trade-offs among costs and various impact types are considered. Descriptors of the alternatives will be established for each phase of AA, and methods presented to ensure that the alternatives are operationally feasible. The descriptors will be determined to some extent by the concurrent work of other contractors concerning methodologies for estimating the costs and impacts of different alternatives.

PERFORMING AGENCY: Charles River Associates, Incorporated, 419
INVESTIGATOR: Kuzmyak, R Tel (617) 266-0500
SPONSORING AGENCY: Transportation Systems Center
RESPONSIBLE INDIVIDUAL: Bronitsky, L

Contract DOT-TSC-1565
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: $104,333

ACKNOWLEDGMENT: Charles River Associates, Incorporated

23 188660
HIGH SPEED RAIL PASSENGER SERVICE IN OHIO
A continuation of study of a statewide rail network with high speed trains connecting Cincinnati and Cleveland on a north-south corridor and Toledo and Youngstown on an east-west corridor. This phase will include engineering design, proposed routes, terminal location, costs of land acquisition and potential benefits of the system.

PERFORMING AGENCY: Dalton, Dalton, Newport
INVESTIGATOR: Lehr, M
SPONSORING AGENCY: Ohio Rail Transportation Authority
RESPONSIBLE INDIVIDUAL: Randall, M Tel (614) 466-5816 Butch, R

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: $1,000,000

ACKNOWLEDGMENT: Ohio Rail Transportation Authority

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

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 156651
DEVELOPMENT OF A FREIGHT ROUTE COMPETITIVE TO CONRAIL
An investigation of the establishment of a private rail system that would be competitive with CONRAIL in the Northeast in general and New York State in particular. This is a continuing study involving the Delaware and Hudson Railway.
REFERENCES:
Challenge and Decision for New York State: The Northeast Rail Crisis, New York State Senate Committee on Transportation, Jan. 1974
Abandoned Railroad Rights-of-Way New York State Senate Committee on Transportation, Mar. 1976
Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation
INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF
SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation
RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1974

ACKNOWLEDGMENT: New York State Legislature

24 159629
FREIGHT CAR UTILIZATION RESEARCH-DEMONSTRATION PROGRAM. EMPTY CAR DISTRIBUTION
The Program will evaluate the feasibility of a pilot implementation by Missouri Pacific of an automated empty car distribution system. The Program will complete the Phase II Task 5 final report by including sections on automated empty car distribution, supply forecasting and fleet size forecasting. The Program Will publicize the conclusions and techniques developed by Task 5 and embodied in the final report.

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) 426-2608 Taylor, CE Tel (202) 293-4084

Contract DOT-FR-771-5279
STATUS: Active NOTICE DATE: Sept. 1979 START DATE: July 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: $15,000

ACKNOWLEDGMENT: AAR

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: Feb. 1979 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 and Operations Policy 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; (4) Freight car management including computerized freight car scheduling and freight car utilization research; (5) Labor/management relations involving experiments with work rules agreements, worker training, strike impact analysis, economic analysis of rail labor factors, and improvement in employee communications; (6) Economic analysis involving statistics and forecasting.

PERFORMING AGENCY: Federal Railroad Administration
SPONSORING AGENCY: Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Boone, JW Tel (202) 426-9682

STATUS: Active NOTICE DATE: Feb. 1979

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. A study investigating the structure and performance of the primary haul agricultural trucking industry in Washington has been undertaken. Ninety-six trucking firms were interviewed and the data computerized. Preliminary results were sent to the truckers in October. Several manuscripts, one on operating characteristics and one on regulatory performance, are underway. Trucking activity in the Basin region is tied very closely to the agricultural production cycle. As such, trucking becomes highly seasonal, reporting only about 4 1/2 months of employment per year. Potatoes and sugar beets are the most common commodities hauled. Primary-haul truckers average 29,000 miles per year loaded and 18,600 miles empty. Over 50% of the trucks were purchased under a debt financing program averaging 3 years in duration at an average interest rate of 11.4%. A second study under the policy CSRS grant is underway with Dr. Robert Tosterud, Asso. Consultant. A manuscript on the Implications of the Quad R Act on Agriculture is currently under review. Two other manuscripts on "demand sensitive rates" and "market dominance" are also outlined. With the assistance of Walter Miklius, Asso. Consultant, we are currently

designing a sample frame for extending the policy study on stability of agriculturally exempt truckers. This survey will be undertaken next year.

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

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: July 1979 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. Phase I of this study addresses the state's historic and legal role, developing a document to aid states in evaluating the impact of service changes and the impact of state participation in merger, consolidation, coordination and bankruptcy proceedings. Phase II addresses impacts on a line-specific basis. The 4R Act establishes time limits for industry restructuring and this study aids state policy decision makers in responding to such proposals and to possible future railroad bankruptcies.

REFERENCES:

Midwest Rail Service Study: The State Role in Railroad Restructuring, Ernst and Ernst

Midwest Rail Service Study: Retrospective Study of Selected Railroad Mergers, Ernst and Ernst

Midwest Rail Service Study: Manual for Assessing the Impacts of Railroad Restructuring, Ernst and Ernst

PERFORMING AGENCY: Ernst and Ernst

INVESTIGATOR: Lutes, GS Tel (202) 862-6334

SPONSORING AGENCY: Iowa Department of Transportation, Office of Advance Planning

RESPONSIBLE INDIVIDUAL: Ward, DE Tel (515) 296-1137

STATUS: Active NOTICE DATE: Apr. 1979 START DATE: May 1978 COMPLETION DATE: May 1980 TOTAL FUNDS: $300,000

ACKNOWLEDGMENT: Ernst and Ernst

25 058753
SCENARIOS FOR ALTERNATIVE ROLES OF THE FEDERAL GOVERNMENT IN TRANSPORTATION

The research shall evaluate the economic effects of existing and prospective Federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. All modes of transportation shall be encompassed intermodal coordinative institutions, and Federal policies affecting domestic intercity transportation in all phases. Economic evaluation shall include the study of efficient resource allocation and distributional effects of alternative policies together with consideration of both partial and general equilibrium effects. The research shall be interdisciplinary in scope, drawing upon engineering, economic, statistics, law, and administration.

REFERENCES:

An Integrated Policy Model for the Surface Freight Transportation Industries, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Econometric Estimation of Cost Functions in the Transportation Industries, Spady, R; Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Information Needs and Performance Measures deNeufville, R; King, C, Center for Transportation Studies, MIT, Report 76-15, Sept. 1976

The Rationale & Scope of Federal Transportation Policy Friedlaender-,AF; Simpson,RW; Frankel, EG; deNeufville; Sloss, Center for Transportation Studies, MIT, Report No. 77-4, Mar. 1977

Hedonic Costs and Economics of Scale in the Regulated Trucking Industry, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 77-5, Jan. 1977

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies
INVESTIGATOR: Friedlaender, AF
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

Contract OS-50239 (FFP)
STATUS: Active NOTICE DATE: Mar. 1979 START DATE: Sept. 1975 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: $400,000

ACKNOWLEDGMENT: TRAIS

25 059207
PROCEDURES FOR INSTITUTING SEPARATE ROUTES FOR DISTINCT RAIL SERVICE

Determine the elements that constitute basic railroad transportation service, identify theoretical and specific terms of those services which should be included under the rubric of distinct services. This will require identification of the characteristics which make some services distinct and analysis of whether provision of those services results in incremental costs to the railroads. Formulate guidelines to be incorporated into the Commissions rules. Describe the regulatory and institutional barriers to initiation of such pricing procedures.

PERFORMING AGENCY: Gellman Research Associates, Incorporated
INVESTIGATOR:
SPONSORING AGENCY: Office of Policy and International Affairs
RESPONSIBLE INDIVIDUAL: Bohan, FJ Tel 202-4264860

Contract DOT-OS-606167 (CPFF)
STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Mar. 1976 TOTAL FUNDS: $41,502

ACKNOWLEDGMENT: TRAIS

25 099365
VALUE CAPTURE POLICY

This research explores legal, financial and comunity design issues resulting from the introduction of mass transit station facilities in a community. Collectively termed "Value Captive", these efforts are becoming increasingly important in the evaluation of transit projects. First year efforts developed major concepts and defined and analyzed the critical issues in the 3 concern areas using Houston, Texas as an example city. Year two took Value Capture and applied it to proposed transit improvements in Los Angeles, Louisville, Kentucky and Chicago. Problems and opportunities for the application of Value Capture techniques by one or more types of public administrative agencies were identified. This included an examination and comparison of significant legal barriers, economic issues, investment opportunities, sources and restrictions on funds, and potential community impacts related to hypothetical examples of transit stop related development. The research teams worked closely with the municipalities involved and the Urban Mass Transit Administration. STATUS: Results from the first year of research detailing the legal, financial and community implications of Value Capture have been published and widely distributed. Second year research has focused on three cities: Los Angeles, Louisville, and Chicago. In each case, prospects for applying Value Capture to proposed mass transit development have been thoroughly evaluated. It was found that there is significant potential for the beneficial application of Value Capture, although the most appropriate techniques for applying it are not the same in each city. In application situations in this work, potential fiscal returns were found to be widely varying depending upon the community under examination, Value Capture techniques used, and the legal basis for their application. In all, it may be summarized that Value Capture's potential success is closely related to the success of the mass transit system itself. Good transit planning will definitely support the success of Value Capture but not insure it.

Final Report, February 1979.

REFERENCES:

Value Capture Policy. 4 Vols. Introduction, Legal Element Financial Element, and Community Enhancement, DOT Publication, DOT-TST-75-85, Nov. 1974

Value Capture and Joint Development Applications Dec. 1975

How to Make Mass Transit Pay its own Fare Design and Environment Magazine, Apr. 1975

Value Capture Policy Planning Mag, Am Soc of Planning Officials, Apr. 1976

Joint Land Use and Transportation Development-Application of the Value Capture Concept, Transportation Research Board, NAS, Jan. 1975

Planning, Financing and Implementing Joint Development A National Transit Symposium, Miami, FLa., Jan. 1975

PERFORMING AGENCY: Rice University, School of Architecture
INVESTIGATOR: Sharpe, CP
SPONSORING AGENCY: Office of the Secretary of Transportation
RESPONSIBLE INDIVIDUAL: Nupp, B

Contract DOT-OS-40007
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1976 TOTAL FUNDS: $175,000

ACKNOWLEDGMENT: DOT

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. The first year of work under this project has resulted in the development of a comprehensive plan of research. Two levels of analysis of the implications of motor carrier regulation are planned: 1) a micro approach focusing on a case-study rural community and 2) a macro approach utilizing secondary, national-level data sources. An extensive literature review has been accomplished; trucking cost information has been assembled; motor carrier rate structures have been described; and plans for making a detailed case-study analysis of effects of regulation have been laid. Grain marketing projections to 1985 have been made for each Nebraska crop reporting district for inclusion in a regional optimization model. Plans are nearing completion for grain elevator survey designed to measure the patterns of grain flows from the state.

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

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: July 1979 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070254)

25 156676
RAIL BRANCH LINE SUBSIDIES AND REHABILITATION
A study of the need for rehabilitation of rail branch lines and methods of subsidizing service on lines operating in the red.
REFERENCES:
Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation
INVESTIGATOR: Mitchell, M Tel (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. 1973

ACKNOWLEDGMENT: New York State Legislature

25 156707
EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS
The project will evaluate the economic effects of alternative federal, state, and local government policies on carriers, shippers, receivers, and rural communities. An inventory of existing transportation regulatories 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. An attitudinal survey of country elevator managers to ascertain if differences in railroad service to country elevators depended on whether they were located on a branch or main line, distance to an elevator on a competing railroad, and railroad was conducted. Only on one statement regarding service in general was there a a significant difference between responses of elevator managers on main and branch lines. On all other comparisons there were no significant differences in the attitude of managers between the different strata toward services such as boxcar condition, roadbed and schedule maintenance as reflected in the 126 usable surveys. Elevator managers' perceptions of the relative importance of 14 service variables were also measured. The demand for transportation service by North Dakota agriculture is being projected to 1985, 1990, and 2000. The state was divided into three regions based on homogeneity of transportation flows. Demand for transportation will be estimated for each of these three regions based on projected production of wheat, feed grains, and soybeans less consumption by livestock. Production statistics by county of the crops and eight classes of livestock have been collected for 16-year period. These data will be used to develop estimating equations.

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: July 1979 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. 1980 START DATE: Jan. 1977 COMPLETION DATE: July 1980 TOTAL FUNDS: $290,000

ACKNOWLEDGMENT: OST

25 160045
FEDERAL POLICY IMPLICATIONS (FPI) PROJECT
The purpose of the Federal Policy Implications (FPI) Project is to respond to the interests of the Federal Government by bringing together the BART Impact Program (BIP) impact findings and their supporting data. BIP is a five-year study of the impacts of the BART system on travel conditions, economic activity, land use, public policies, and other aspects of life in the San Francisco Bay Area.

PERFORMING AGENCY: Voorhees (Alan M) and Associates, Incorporated
SPONSORING AGENCY: Office of Policy and International Affairs
RESPONSIBLE INDIVIDUAL: Grainger, GR Tel (202) 426-4168

Contract DOT-OS-70034 (CPFF)
STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1977 TOTAL FUNDS: $78,650

ACKNOWLEDGMENT: TRAIS

25 179675
AN ASSESSMENT OF THE ECONOMIC IMPACT OF USER CHARGES FOR INLAND WATERWAY TRANSPORTATION
Evaluate the impact of alternative user charges for inland waterways upon shipping costs and consumer prices. Evaluate administration costs and revenue potential of alternative user charges. Develop information on inland waterway cost-sharing. Develop an economic model of interegional competition which emphasizes the role of transportation costs. By changing freight rates, their impacts on transportation mode, shipping patterns, and prices will be identified.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, Department of Agricultural Economics, VA-0375868-1
INVESTIGATOR: Shabman, L
SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: June 1979 START DATE: Oct. 1977

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074345)

25 188665
STATE RAIL PROGRAM EVALUATION
The project will evaluate the effectiveness of the Local Rail Service Assistance Program. The evaluation has three objectives: (1) to evaluate the effectiveness of the Program in meeting its objectives as established by Congress and as perceived by the State; (2) to identify problems and recommend alternative solutions to improve Program effectiveness; and (3) to develop a continuing evaluation process to be used by FRA and States. Interviews are being conducted with key officials at the Federal, State and local levels, and with shipper and railroad executives to determine the objectives, policies and problems in implementing the Program as originally intended by the Congress and modified in subsequent legislation. Information will be compiled on the affect of the implementation of the Program on railroad financial conditions, program expenditures, State obligations, and community impacts.

PERFORMING AGENCY: Ernst and Ernst
INVESTIGATOR: Tyndall, GR Tel (202) 862-6000 Taggart, RE Swartz, DJ Walker, N
SPONSORING AGENCY: Department of Transportation; Federal Railroad Administration
RESPONSIBLE INDIVIDUAL: Tusaie, W Tel (202) 426-1677

Contract DOT-FR-8211
STATUS: Active NOTICE DATE: Aug. 1979 START DATE: Sept. 1978 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: $134,000

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: Active 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. 1980 START DATE: May 1979 COMPLETION DATE: Feb. 1981 TOTAL FUNDS: $300,000

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. 1980 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.

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SOUTH DAKOTA STATE UNIVERSITY Department of Economics; Brookings, South Dakota, 57006
22A 179668, 22A 196122
SOUTHWEST RESEARCH INSTITUTE Engine Research & Development, Dept of Engine & Vehicle Res; San Antonio, Texas, 78284
16A 196749
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SOVIET JOURNAL OF NONDESTRUCTIVE TESTING Plenum Publishing Corporation; 227 West 17th Street; New York, New York, 10011
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00 302136

T

U

V

VIRGINIA UNIVERSITY Department of Civil Engineering; Charlottesville, Virginia, 22904
23A 058757
VIRGINIA UNIVERSITY School of Engineering and Applied Science; Charlottesville, Virginia, 22904
02A 188653
VOORHEES (ALAN M) AND ASSOCIATES, INCORPORATED Westgate Research Park; McLean, Virginia, 22101
10 199069, 10 199070, *25A 160045*

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09 197758
WASHINGTON UNIVERSITY, ST LOUIS School of Engineering and Applied Science, P.O. Box 1130; St Louis, Missouri, 63130
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